LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA19 | Coleshill Junction

Survey reports (CH-004-019)

Cultural heritage

November 2013

ES 3.5.2.19.7

VOL 5

LONDON-WEST MIDLANDS
ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA19 | Coleshill Junction

Survey reports (CH-004-019)

Cultural heritage

November 2013

ES 3.5.2.19.7

Department for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

A report prepared for High Speed Two (HS2) Limited.

High Speed Two (HS2) Limited,
Eland House,
Bressenden Place,
London SW1E 5DU

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: HS2enquiries@hs2.org.uk

Website: www.hs2.org.uk

recycle

Printed in Great Britain on paper
containing at least 75% recycled fibre.

Appendix CH-004-019

Environmental topic:	Cultural heritage	CH
Appendix name:	Survey report	004
Community forum area:	Coleshill Junction	019

Contents

List of figures

List of tables

1 Introduction

1.1 Structure of the cultural heritage appendices

1.1.1 The cultural heritage appendices for the Coleshill Junction CFA (CFA19) comprise:

- Appendix CH-001-019 – Baseline Report;
- Appendix CH-002-019 – Gazetteer of Heritage Assets;
- Appendix CH-003-019 – Impact Assessment Table; and
- Appendix CH-004-019 – Survey Reports (this appendix).

1.1.2 Maps referred to throughout the cultural heritage appendices are contained in the Volume 5 cultural heritage map book.

1.2 Surveys undertaken

1.2.1 This appendix contains the results of extensive archaeological surveys undertaken. Key surveys reported in this appendix include:

- LiDAR survey of the majority of the construction area;
- hyperspectral survey of the majority of the construction area;
- a site survey of earthworks associated with the former Coleshill Manor (CN020); and
- geophysical surveys at 5 locations along the route (CN020, CN022, CN023, CN025 and CN026) encompassing some 2.5, 5.4, 4.8, 14 and 15 hectares respectively.

1.2.2 The results of aerial photographic analysis have been incorporated into the baseline report in Appendix CH-001-019 and are not reported separately for this CFA.

2 LiDAR and hyperspectral survey report

2.1 Introduction

2.1.1 The Coleshill Junction CFA extends from the Amston Green in the South to Water Orton in the North a 6.6km stretch aligned broadly north to south. Although the land take is largely rural in nature, it is hemmed in by motorways and extensive settlements, with the outskirts of Birmingham (in the form of Marston Green and Water Orton) to the south west, west and north and Coleshill to the east.

2.2 Methodology and limitations of analysis

LiDAR data

2.2.1 The filtered LiDAR data was used to create a Digital Terrain Model (DTM), and analysed in the GIS as three rasters comprising elevation data, a hillshade map and a slope map. Similarly, the unfiltered LiDAR data was used to create a Digital Surface Model (DSM) also analysed as elevation data, a hillshade map and a slope map.

2.2.2 Both the DTM and DSM were viewed as rasters in an ARCView GIS project. All identified features were digitised in the GIS from these rasters.

Hyperspectral data

2.2.3 The hyperspectral data was supplied as a series of ENVI DAT raster files, divided into 22 different sections (runs) covering the area of interest (CFAs 16 – 22). Each ENVI DAT contained 34 bands, representing a portion of the electromagnetic spectrum which included visible light and the near-infrared range. The data had a horizontal cell resolution of 1m.

2.2.4 A number of ArcGIS 10's out-of-the-box tools were used to extract, process and analyse the data. Initially, the ENVI DAT files were imported into a mosaic dataset stored within an ArcGIS 10 file geodatabase. A single combined raster dataset, containing the 34 bands, was created from the mosaic dataset.

2.2.5 As no more than three bands can be viewed at once using ArcMap (the red, green and blue bands of the raster dataset) there is a requirement to investigate subsets of the hyperspectral dataset. Particular attention was paid to the near-infrared and the visible red parts of the electromagnetic spectrum, due to the recognised potential of these in helping to highlight archaeological features (Parcak 2009, 101-2). The near-infrared range (760nm to 900nm on the electromagnetic spectrum) covered bands 6 to 13 in the hyperspectral dataset. The visible red range (605nm to 690nm on the electromagnetic spectrum) covered bands 18 to 22 in the hyperspectral dataset.

2.2.6 The near-infrared and visible red bands were extracted from the combined raster dataset, allowing for these bands to be viewed in isolation. Principal Component Analysis was also carried out on these bands using ArcGIS 10's Principal Components tool. The extracted bands were used to generate a series of single output raster datasets for both the near near-infrared and visible red hyperspectral data; this included a single principal component layer dataset and a multiple principal component layer dataset for both ranges. Different principal component layers could then be assigned to the red, green and blue bands of the multiple principal component layers raster datasets.

Digitising

2.2.7 All feature identification was undertaken manually and compared to the results of available aerial photograph evidence. Both hyperspectral and LiDAR plots were examined in detail and features and areas of likely archaeological potential were digitised manually using ArcGIS 10. These features can be seen in Table 1 below. Archaeological features have been assigned a unique WA number, and are briefly described. Where possible broad dates have been suggested based on the form of the features, and the identification of the features has been assigned a confidence rating (based on a simple five point scale (Low, Low to Moderate, Moderate, Moderate to High and High). Where possible, similar features with a common distribution (e.g. former field boundaries or ponds within a coherent area) have been grouped together.

Limitations

2.2.8 The LiDAR data used in the study if this CFA covered virtually the entirety of the land required, temporarily and permanently, to construct the Proposed Scheme, as well as a significant portion of the wider 500m study area. As a result, sites have been identified across much of the land required, temporarily and permanently, to construct the Proposed Scheme and the wider study area. The LiDAR data available extended across the entirety of the land required, temporarily and permanently, to construct the Proposed Scheme, with a single exception – a small area of Chelmsley wood encompassing a small part of a recreation area. In addition, the data extended across much of the 500m buffer zone, providing good coverage of the CFA as a whole.

2.2.9 Much of the land required, temporarily and permanently, to construct the Proposed Scheme is still rural land, although the presence of numerous motorways hemming this area is a testament to the developed area of the wider landscape. Within the land required, temporarily and permanently, to construct the Proposed Scheme, it has been possible to use both the DSM and DTM as interpretative tool, although woodland coverage and standing crops limited the usefulness of the DSM as an interpretative tool. In these cases, however, the DTM was usually significantly detailed to allow confident interpretation of landscape features. Neither the DSM nor DTM are particularly useful in identifying features within built up areas, unless these lie within areas of open space. The effectiveness of LiDAR was therefore considerably reduced when dealing with much of the settlements fringing the land required, temporarily and permanently, to construct the Proposed Scheme and within the wider 500m study area.

2.2.10 Unfortunately, the Hyperspectral data provided did not contain bands representing the mid-infrared range (approximately 8500nm to 13000nm on the electromagnetic spectrum). The mid-infrared range is regarded as holding particularly high potential when attempting to identify archaeological features; the Hyperspectral dataset contained no data beyond 992nm on the electromagnetic spectrum.

2.2.11 The horizontal cell resolution of the data also restricted the identification of smaller features (1m intervals) is also likely to have influenced the visibility of small archaeological features and lessened the clarity of some of the larger features.

2.2.12 The effectiveness of Hyperspectral data in identifying archaeology can be significantly influenced by a number of factors, including the nature of the underlying geology, the water content of the ground and the type of ground cover. Significant areas of the route studied lie within dense woodland, where there is no likelihood of features being recognised through analysis of Hyperspectral data, or beneath cereal crops, where the identification of features is

likely to vary. It also suffers from the same limitations as the LiDAR data in built up areas. Because of these variations, other techniques used for identifying areas of archaeological potential (notably the Normalised Vegetation Data Index (NVDI) and the Water Band Index) were not examined in detail.

2.2.13 The Hyperspectral data supplied covered virtually all of the land required, temporarily and permanently, to construct the Proposed Scheme and also covered the majority of the 500m study area. The overall coverage provided by the Hyperspectral data is therefore excellent, although because of the number of variables affecting the visibility of features and the limitations in the bandwidth recovered, it should be noted that the features already identified are likely to represent only a portion of those within the CFA.

2.2.14 Despite these limitations, it is considered that the available LiDAR and Hyperspectral data provides comprehensive coverage of the land required, temporarily and permanently, to construct the Proposed Scheme as well as providing evidence for much of the surrounding 500m study area.

2.3 Results

2.3.1 A total of twenty four sites were identified on the Hyperspectral and LiDAR plots within Community Forum Area 19. The bulk of these were identified on the LiDAR plots, with a smaller number also visible on the Hyperspectral imagery. Many appear on both. These are listed in Table 1 below.

2.3.2 This CFA is largely rural in nature and contains many of the rural features associated with the development of a medieval and post-medieval agricultural landscape – ridge and furrow, field boundaries, ponds, hollows and evidence for agricultural settlement. Here, however, the contemporary landscape is dominated by the parkland of Coleshill Park, and the presence of large settlements all around the LLAU and modern motorways within it are testament to the massive development of the area in the modern period.

2.3.3 The landscape clearly has its main origins in the medieval period, and it appears to have been originally a rural agricultural landscape, pre-dating the emparkment associated with Coleshill Hall. A number of areas of former ridge and furrow ploughing, relict field boundaries, ponds and hollows have been recorded. In some areas, coherent elements of a medieval landscape can be identified, such as the probable moated site to the North East of Chelmsley Wood (WA19.10, see Figure 1) which appears to be directly related to areas of ridge and furrow fields (WA19.9) and relict field boundaries (WA19.11). A second such complex can be seen to the south of Birmingham road, where a second moated site (WA19.14) along with a series of associated enclosures or platforms can be directly associated with former boundaries (WA19.16) and areas of ridge and furrow (WA19.13) on both banks of the River Cole (see Figure 2). Further areas of ridge and furrow agriculture were noted to the north east and north of the park (WA19.28 and WA19.29)

2.3.4 There is evidence for similar and probably contemporaneous activity within Coleshill Park itself, with areas of ridge and furrow still extant within the park (WA19.19), predominantly occupying land close to the course of the River Cole. In some cases these appear to be directly associated with some of the relict boundaries within the park (WA19.22). This strongly suggests that the park was at least partly created from farmland in the medieval period. A large moat at the southern end of the park appears to mark the site of the medieval manor house (WA19.17 see Figure 3), which appears to have been approached from the south east along the track known as Hall Walk, now defunct (WA19.15). At a later date the current hall (WA19.23) was built further to the north. The deer park itself (WA19.24 is fairly well defined, with extensive stretches of park pale (WA19.21) surviving in places. A post-medieval duck decoy pond (WA19.16) survives largely intact close to the south western edge of the park, and was probably built at a time when the role of the park was changing.

2.3.5 Other features of note include a series of ponds, and associated boundary or drainage features, possibly relating to areas of former quarrying and a number of relict channels of the River Cole (WA19.13). The latter clearly mark earlier courses of the river, and may contain evidence for earlier human activity associated with the river.

2.4 Summary

2.4.1 This CFA is dominated by the Coleshill Park. This clearly incorporated elements of an earlier medieval landscape. A number of features relating to the use of the park still survive, as does the substantial moat enclosing the original manor. Outside the park two moated sites have been identified to the south, each associated with numerous relict boundaries and areas of ridge and furrows. These seem likely to have been domestic sites, perhaps farmsteads. Also of interest are a number of post medieval or modern ponds, possibly former quarries and former courses of the River Cole. The area has also seen extensive modern development.

2.5 References

Parcak, S, H. (2009), Satellite Remote Sensing for Archaeology. Routledge, Abingdon.

2.6 Figures

Figure 1: Sites WA19.9, 19.10 and 19.11. Probable moated site North East of Chelmsley Wood (pink) with associated ridge and furrow (orange) and former field boundaries (red). LiDAR plot.

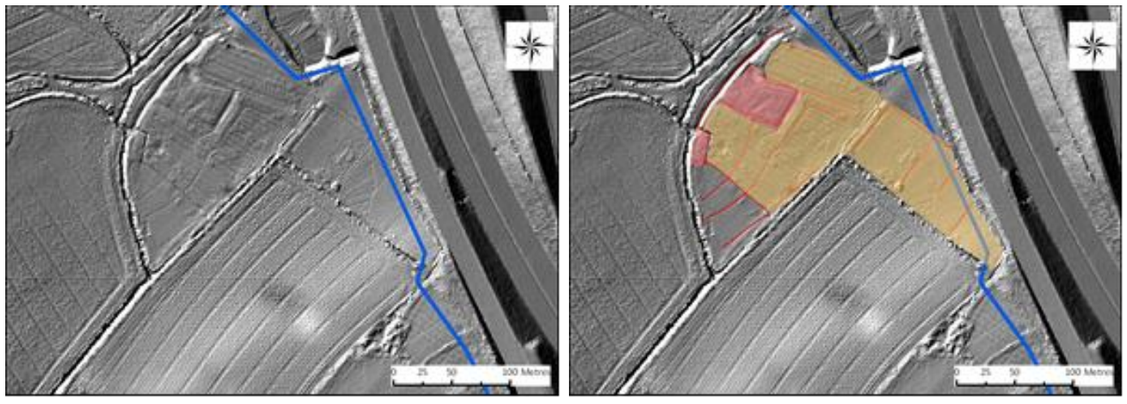


Figure 2: Sites WA19.14, 19.13and 19.16. Probable moated site (pink) south of Birmingham Rd and surrounding ridge and furrow (orange) and former field boundaries (red). LiDAR plot.

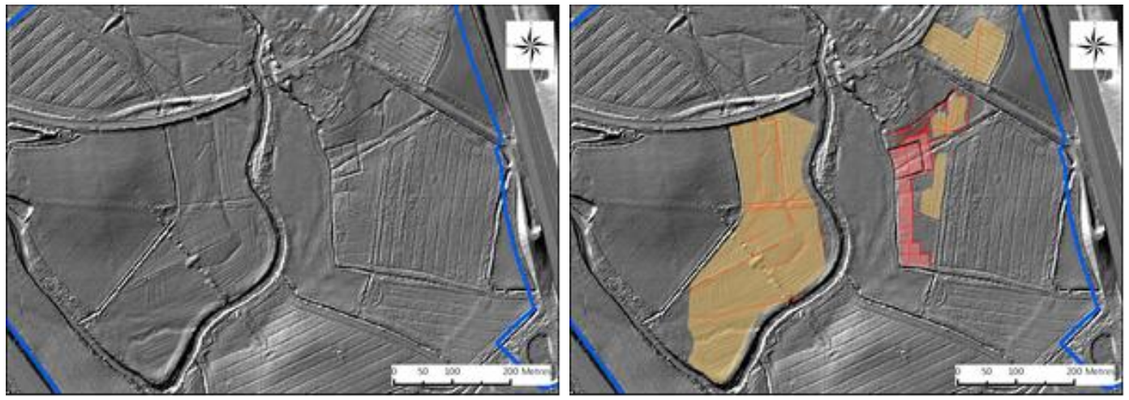


Figure 3: Sites WA19.17, 19.19, 19.21, 19.22 and 19.24. Coleshill Park (beige), park pale (red), moat (pink) associated anomalies (green) and remnant ridge and furrow (orange). LiDAR plot.

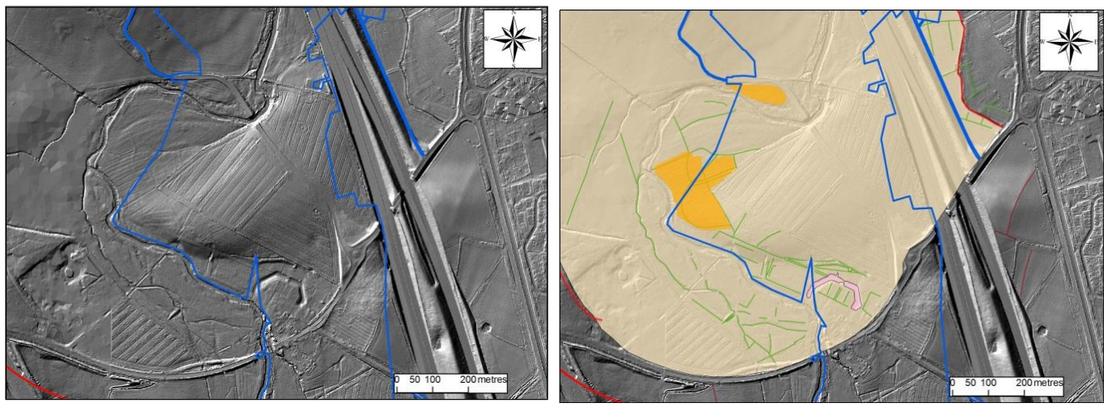
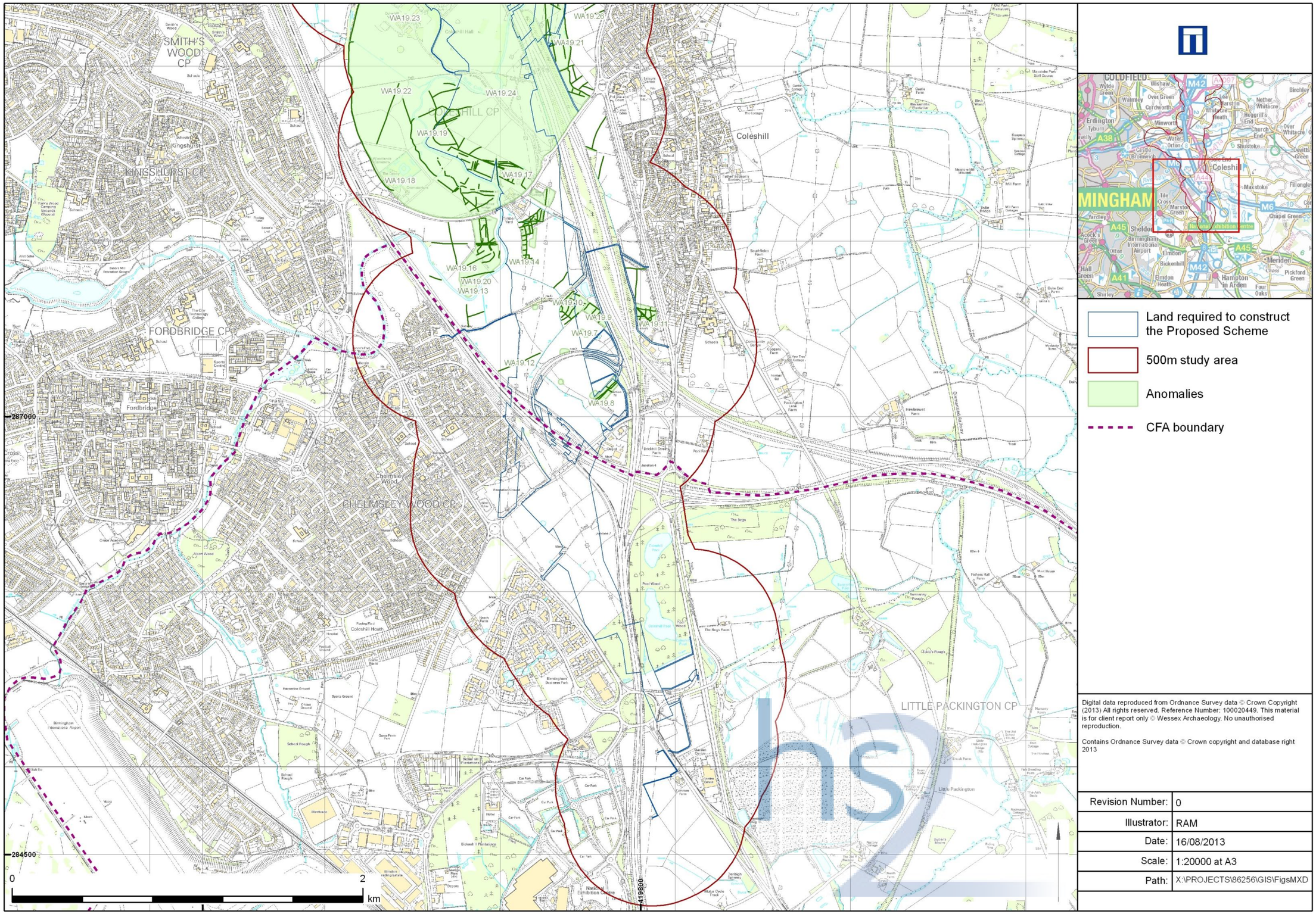
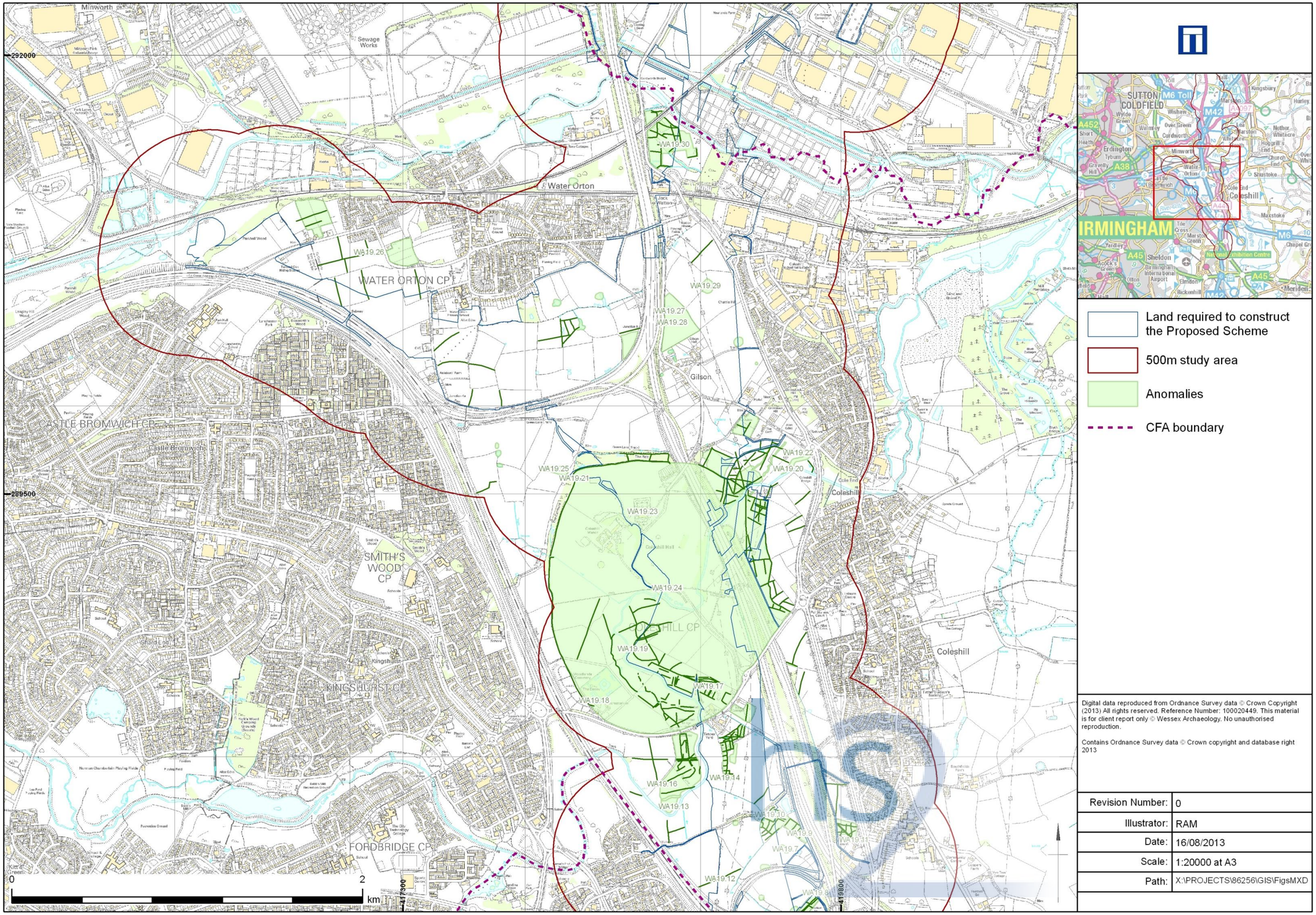


Figure 4: Anomalies within CFA19



Revision Number:	0
Illustrator:	RAM
Date:	16/08/2013
Scale:	1:20000 at A3
Path:	X:\PROJECTS\86256\GIS\FigsMXD

Figure 5: Anomalies within CFA19



Revision Number:	0
Illustrator:	RAM
Date:	16/08/2013
Scale:	1:20000 at A3
Path:	X:\PROJECTS\86256\GIS\FigsMXD

2.7 Identified sites

Table 1: Sites within CFA19

No	CH-002-019 identifier	Site	Eastings	Northings	Description	Date	Confidence rating
WA19.7	Modern feature – not included in CH-002-019	W of Junction 7a	419365	287375	5 hollows, possibly former quarries. Visible on LiDAR plots	Undated	Moderate to High
WA19.8	COL103	W of Junction 7a	419600	218140	Area of linear boundaries, probably former field or enclosure boundaries. Visible on LiDAR and Hyperspectral plots	Post-medieval/ Modern	Moderate to High
WA19.9	COL006	NE of Chelmsley Wood	419450	287635	Areas of Ridge and furrow on WNW-ESE and NE-SW alignment. Associated with a possible moated site. Visible on LiDAR plots	Medieval/post-medieval	Moderate to High
WA19.10	COL006	NE of Chelmsley Wood	419400	287650	Moated site associated with a second ditched enclosure also possibly for a building. Directly associated with relict boundaries and ridge and furrow systems. Visible on LiDAR and Hyperspectral plots	Medieval/post-medieval	Moderate to High
WA19.11	COL006	NE of Chelmsley Wood	419475	287645	Former field boundaries associated with areas of ridge and furrow and probable moated site. Visible on LiDAR plots	Medieval/post-medieval	Moderate to High
WA19.12	COL004	S of Birmingham Rd	418725	287985	Series of linear boundaries, probably the remains of former field boundaries. Visible on LiDAR plots	Post-medieval/ Modern	Moderate to High
WA19.13	COL008	S of Birmingham Rd	418950	288000	Areas of Ridge and furrow on WNW-ESE and NE-SW alignment. Associated with a possible moated site. Visible on LiDAR and Hyperspectral plots	Medieval/post-medieval	Moderate to High
WA19.14	COL009	S of Birmingham	419140	288060	Moated site and associated enclosures or platforms. Visible	Medieval/post-medieval	Moderate to High
		Rd			on LiDAR and Hyperspectral plots		
WA19.15	COL012	Hall Walk	419300	288160	Probable line of a former road or track, likely to lead to the former site of Coleshill Hall. Visible on LiDAR and Hyperspectral plots	Medieval/post-medieval	Moderate to High
WA19.16	COL008	S of Birmingham Rd	418930	287985	Former field boundaries associated with areas of ridge and furrow and probably moated site. Visible on LiDAR plots	Medieval/post-medieval	Moderate to High
WA19.17	COL014	Coleshill Hall	419050	288400	Moat marking the likely site of the medieval Coleshill Manor. Defines 5 sides of an octagon. Visible on LiDAR and Hyperspectral plots	Medieval/post-medieval	High
WA19.18	COL019	Coleshill Park	418410	288400	Duck decoy pond within a rectangular enclosure. Visible on LiDAR plots	Medieval/post-medieval	High
WA19.19	COL015	Coleshill Park	418630	288700	Areas of ridge and furrow ploughing preserved within former parkland. Visible on LiDAR plots	Medieval/post-medieval	Moderate to High
WA19.20	COL008	Coleshill Park and surrounds	418830	287775	Meandering linear anomalies, probably a former channels of River Cole. Visible on LiDAR plots	Undated	Moderate to High
WA19.21	COL023	Coleshill Park	418135	289120	Stretches of the former park pale still survive well. Visible on LiDAR plots	Medieval/post-medieval	Moderate to High
WA19.22	COL015	Coleshill Park	418840	288430	A number of linear earthworks are visible within the park, presumably representing former land divisions. Visible on LiDAR plots	Medieval/post-medieval	Moderate to High
WA19.23	COL052	Coleshill Park	418670	289385	Coleshill Hall. Country House. Visible on LiDAR and Hyperspectral plots.	Post Medieval and Modern	High

No	CH-002-019 identifier	Site	Eastings	Northings	Description	Date	Confidence rating
WA19.24	COL015	Coleshill Park	418850	288900	Medieval and post-medieval deer park. Visible on LiDAR and Hyperspectral plots.	Medieval/post-medieval	High
WA19.25	COL015	W of Coleshill Park	418145	289640	4 large hollows. Possibly former quarries or ponds. Visible on LiDAR plots.	Undated	Moderate to High
WA19.26	COL037 and COL042	N of Coleshill Park	418205	290400	Series of linear boundaries, probably the remains of former field boundaries. Visible on LiDAR plots	Post-medieval/ Modern	Moderate to High
WA19.27	COL090	N of Coleshill Park	418320	290450	7 ponds. Possibly former quarries. Visible on LiDAR plots	Post-medieval/ Modern	Moderate to High
WA19.28	COL090	N and NW of Coleshill Park	418585	290360	Areas of ridge and furrow ploughing preserved to N and NW of former parkland. Visible on LiDAR and Hyperspectral plots	Medieval/post-medieval	Moderate to High
WA19.29	COL106	N and NE of Coleshill Park	419030	290680	4 hollows. Possibly the remains of former quarries. Visible on LiDAR plots	Undated	Moderate to High
W19.30	COL048	NE of Water Orton	418800	291550	Former field boundaries and areas of possible ridge and furrow. There appears to be more than one phase of enclosure represented. 2 areas of possible ridge and furrow. Visible on LiDAR plots	Medieval/post-medieval	Moderate to High

3 Site Surveys

3.1 CN020 Land off Birmingham Road (B4114), near Coleshill, Warwickshire

Introduction

Project background

3.1.1 Wessex Archaeology was commissioned by Atkins, on the behalf of HS2, to carry out a survey of a parcel of land (CN020) off the Birmingham Road (B4114) near Coleshill, Warwickshire (Figure 6), hereafter "the Site" (centred on NGR 419058 288354). It lies 200m to the north of Coleshill Hall Farm. The survey forms part of an on-going programme of archaeological works being undertaken ahead of the proposed development of HS2.

3.1.2 This Site, CN020, was selected for a sketch survey in order to provide a clearer understanding of the known medieval earthworks on the site and identify any other earthworks of interest. LiDAR survey identified several topographic features of archaeological potential (Wessex Archaeology 2012). A detailed gradiometer survey demonstrated the presence of anomalies of likely and possible archaeological interest within the survey area (Wessex Archaeology 2013a)

Site details

3.1.3 The Site comprises one field located just north of Birmingham Road (B4114) and lies approximately 1km west of the centre of Coleshill, within but close to the southern edge of the former medieval deer park. The limits of the sketch survey area are defined by modern field boundaries for much of the area with the southern limits defined by Birmingham Road and the western limit defined by the River Cole (Figure 6).

3.1.4 The Site lies on an area of relatively flat land between 80m aOD (above Ordnance Datum) and 81m aOD. The land falls below 80m aOD along the bank of the River Cole to the west.

Archaeological background

3.1.5 Several areas of archaeological interest have been previously identified and were visible in the LiDAR survey (Figure 7). The site lies within and close to the southern edge of Coleshill Park, a medieval and post-medieval deer park (Warwickshire HER 3683). A polygonal earthwork within the site itself has been interpreted as a moat (Warwickshire HER MWA290), likely marking the location of the medieval Coleshill Manor (Warwickshire SMR 289). A series of features identified a number of linear earthworks surrounding the moat, some thought likely to represent the remains of associated features, whilst others are likely to represent medieval/post- medieval land divisions (Wessex Archaeology 2012).

Methodology

Survey objectives

3.1.6 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology which outlined the aims of the survey and the proposed methodology to be followed (Wessex Archaeology 2013b). The stated aims include the following:

- to conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- to clarify the presence/absence and extent of any earthworks within the site; and
- to determine the general nature of the remains present and confirm the interpretation suggested by the LiDAR analysis.

3.1.7 This report presents a brief description of the methodology followed, the survey results and the archaeological interpretation of the features identified.

Survey dates

3.1.8 The survey was carried out by Wessex Archaeology on the 30th July 2013.

Instruments used and survey method

3.1.9 The sketch survey employed a mixture of measured and photographic survey.

3.1.10 The measured survey was conducted using a Leica Viva DGPS (Differential Global Positioning System) in RTK (Real Time Kinematics). This solution provided accuracy compliant with the precision of control stated in section 2.1.1 of Metric Survey Specifications for English Heritage (English Heritage 2003) of +/-30mm All earthwork features were to have their tops and bases surveyed in this fashion, along with significant breaks of slope. In addition seven profiles were surveyed running across the features identified. Finally representative spot heights were recorded.

3.1.11 The photographic survey comprised two-levels of recording. The first level recorded the general character and nature of the Site with the second level made consisting of detailed shots of individual features. The detailed shots contained a 1m or 2m scale bar as appropriate. The location of photographs was recorded on appropriately scaled mapping showing the location and direction of shot.

3.1.12 The photographic record comprised digital photographs taken with a Canon EOS 350D 8mp digital camera. The photographic record was made in tandem with the measured survey.

3.1.13 The full photographic record, together with copies of the marked up plans and a photo gazetteer will be included in the site archive.

Data processing

3.1.14 All measured survey data recorded with the Leica DGPS was exported as both .DBX and .TXT file formats. The exported data was subsequently processed within Wessex Archaeology's in house software and exported to AutoCAD (AutoCAD map 3D 2011) as a .DWG file.

3.1.15 This report contains plans showing the location of identified earthworks and features on Ordnance Survey base mapping. Plans and profiles are also included where these enhance the understanding of the feature.

3.1.16 Selected photographs from the photographic survey have been included within this report, whilst smaller scale copies of the photographs are incorporated within the accompanying gazetteer.

Results

Introduction

3.1.17 The survey identified 7 features of archaeological significance. These were numbered and are briefly described as feature 1, an embankment to the north of the site, feature 2, a large polygonal moat, features 3-6, three linear drain features and features 6 and 7, two terraced areas.

3.1.18 The ground conditions during the survey consisted of mid-length grass being used intermittently as pasture.

3.1.19 The survey has confirmed the presence of the earthwork features identified by the LiDAR survey of the area (Figure 7). It has also identified an anomaly visible in the LiDAR data which was not identified as archaeologically significant in the interpretation.

3.1.20 The sketch survey has confirmed the interpretation of the moat (feature 2) and an associated embankment to the north (feature 1). In addition it has added to the understanding of several more ephemeral earthwork features visible in the LiDAR data (features 3 and feature 4). The survey identified the track way intersecting the moat at its eastern edge as of modern construction supporting the interpretation of this feature as a probably modern causeway (Gatehouse, 2013) and revealed one feature not clearly visible in the LiDAR data, feature 5.

3.1.21 Features 6 and 7 were identified as areas of deliberate terracing associated with construction of moat feature 2. Feature 6 lies within the area enclosed by the moat to the south of the site with feature 7 occupying an area up to around the outer perimeter of the moat between a field boundary to the west, feature 2 to the north and a highway to the east.

3.1.22 Several subtle rectilinear features orientated north-east to south-west were identified during the LiDAR interpretation within the area enclosed by moat feature 2; these were not recognised possibly because these ephemeral features were obscured by the pasture grass.

Interpretation: Archaeology

3.1.23 Feature 1: An irregular curved embankment running along the north of the site (Figure 8). This embankment runs for approximately 142m across the site and stands 1.3m high with a consistent flat slope of approximately 30 degrees running downwards from north to south. Its formation is likely the product of deliberate landscaping for the creation of a terrace (feature 7) outside the moat (feature 2), with which it is clearly associated. This suggests that the feature is of medieval or early post-medieval origin.

3.1.24 Feature 2: The remains of a polygonal moat which may have been octagonal in plan when complete (WA19.17). Only the north eastern half remains with three complete arms (running SW/NE, NW/SE and NNW/SSE respectively) and two partial arms (Figure 8). The moat is 24.7m wide at its widest point and 1.7m deep at its deepest (Profile 5). There are no visible signs of the remainder of the moat in either the LiDAR or the survey data (Figure 7 and Figure 8). Farm buildings cover what would have been the southern part of the moat (Figure 6) and the River Cole the south western part. It may be that the river has eroded or perhaps even formed this section of the moat (ibid.). The Gatehouse gazetteer (2013) suggests that Hall Walk which approaches the site from the south east could indicate that there was originally access across the moat from this direction. Indeed the extant shape of the moat at its current eastern terminus suggests that this marks one half of such a causeway (Profile 7). This contrasts with the current western terminus which has unclear boundaries. Ploughing which has previously occurred on the site (ibid.) explains the state of the western terminus, but not the eastern one. The moat encloses terrace feature 6 and formerly surrounded the contemporary Coleshill Hall, a medieval and post-medieval manor house.

3.1.25 Feature 3: A probable drainage channel into moat feature connecting to the south eastern arm of the moat (feature 2), this feature is more substantial than the other two potential drains (features 4 and 5). It runs a winding course from south east to north-west for 46.7m but has likely been truncated by the field boundary and road which form the border of the site. It is 0.6m deep at its deepest point (Profile 6). Its relationship with feature 2 suggests that it is medieval or early post-medieval in origin.

3.1.26 Feature 4: A possible drain into the moat located on its north-eastern corner (Figure 8). This was visible in the LiDAR as one of a number of linear anomalies on the site. It runs on a NE/SW alignment for 6.8m and is 7.2m wide at its north eastern end and 6.2m wide where it meets the moat (feature 2). The edges of this linear are somewhat irregular in plan, and it narrows to some 5.5m wide in its central section. It is 0.33m deep at its deepest point (Profile 4). The feature slopes down from the terrace to the north (feature 7) to the south, and may have acted as a drain for this area. Its relationship with feature 2 suggests that it is medieval or early post-medieval in origin.

3.1.27 Feature 5: A possible drain into the moat located 7m south east of its northern corner (Figure 8). This was interpreted as part of the moat from the LiDAR data, but through the sketch survey has been identified as a feature in its own right. It runs NE/SW for 11 m and increases in width from 2.3m at its north eastern end to 4.3m at the point where it joins the moat (feature 7). It is 0.6m deep at its deepest point (Profile 2). Its relationship with feature 2 suggests a medieval or early post-medieval origin.

3.1.28 Feature 6: An area of levelled ground bounded by the moat (feature 2), interpreted as a building terrace. This is approximately 0.80m higher than the land surrounding the moat (feature 7). This terraced area contained the building complex comprising the medieval Coleshill Manor (Warwickshire HER ID 290), some elements of which may explain rectilinear features visible on the LiDAR plots but were too ephemeral to that were not identified during the sketch survey (Figure 7, WA19.22).

3.1.29 Feature 7: An area of level ground outside the extent of the moat (feature 2). This is approximately 1m lower than the area comprising feature 6 and may represent the effects of terracing; this is indicated by the embankment to the north of the site (feature 1). If this area was deliberately terraced, it is likely that it is either contemporary with or predates the moat's construction (Gatehouse, 2013). It is possible that features 3 to 5 were dug to help drain water from this area. The suggestion that this area was at least partially terraced is supported by the presence of Feature 1.

Conclusions

Introduction

3.1.30 The sketch survey has confirmed the presence of and recorded the moat (feature 2) and other features (features 1, 3 and 5) identified in the LiDAR data and provided a more detailed understanding of the present condition of these surviving earthworks. It has also further elucidated the nature and relative date of some of the other earthworks on the site. The features identified support the idea that this moat enclosed is the location of Coleshill Manor, that access to the manor across the moat was from the south east. The moat was probably fed from the nearby River Cole, which may also have formed one arm of the moat. It also seems likely that the area to the north and north east of the moat was at least partially terraced, reducing its height in places to create a level area.

Discussion

3.1.31 The sketch survey successfully clarified the nature and extent of the features identified through the interpretation of the LiDAR data attributing the majority of the features to the medieval period.

3.1.32 The results from the survey indicate that the site consists of a series of archaeologically significant features, 1 to 7, associated with the construction of the medieval Coleshill Manor (Warwickshire HER ID 290).

3.1.33 Feature 1 was seemingly created during the terracing of the area to the north and north east of the moat enclosing the Manor, and is possibly contemporary with the initial construction of the moat. Two drainage features dug to drain water to the moat may be associated with the use of this area. To the east, a ditch (feature 3) probably also fed water into the moat from the east.

3.1.34 The survey also established that the area enclosed by the moat (Feature 6) is both higher than the surrounding land, and appears to have been levelled. This indicates that it is likely to have been an artificial terrace upon which the buildings of Coleshill Manor would have been stood.

3.1.35 A North/South orientated causeway which cuts diagonally across the western side of the moat was identified as considerably later in origin than the medieval features and supports a modern trackway.

References

Bibliography

Gatehouse (2013), Coleshill. http://www.gatehouse-gazetteer.info/English%20sites/3524.html Accessed 29 August 2013.

Wessex Archaeology (2013a), CN020 geophysics report.

Wessex Archaeology (2013b), HS2 Method Statement for Field Survey. Report reference 86254.54.

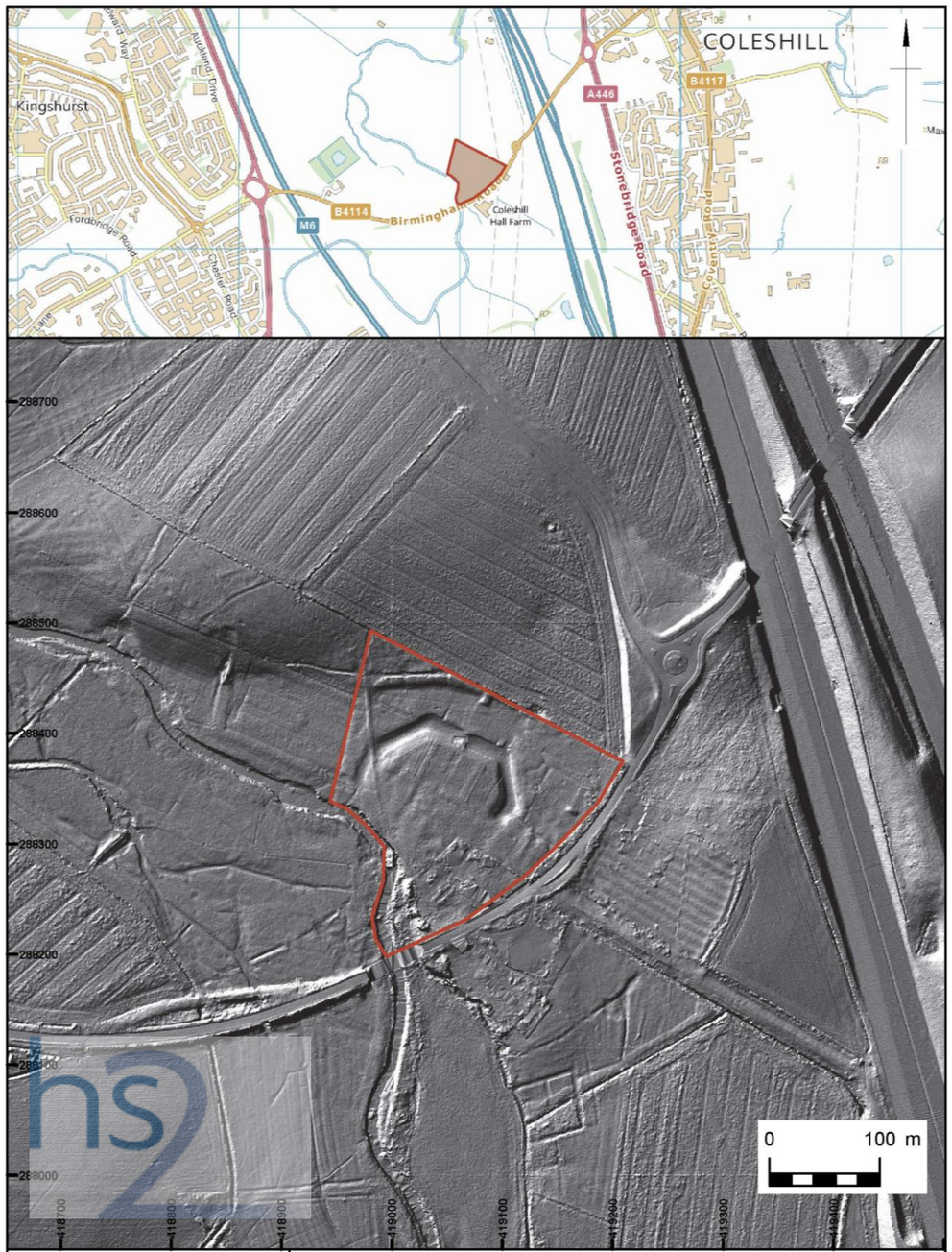
Warwickshire Historic Environment Record.

Table 2: Gazetteer of identified features

Feature ID	Description	NGR	
1	Curvilinear bank, approximately 142m long and 1.3m high. Probably associated with terrace feature 7 and medieval or early post-medieval in origin	418984, 288441 to 419123, 288416	
2	Polygonal cut feature, maximum dimensions 24m wide and 1.7m deep. Seemingly at least four arms of a potentially octagonal moat surrounding the medieval and post-medieval Coleshill Manor	418968, 288353 to 419091, 288319	
3	Slightly sinuous linear ditch feature running into eastern arm of moat feature 2 from the south-east. Feature is 46m long, 0.6m deep and 7m wide at its widest. Probably served to feed water into the moat and is therefore medieval or early post-medieval in origin	419145, 288297 to 419111, 288325	
4	Linear ditch feature running NE to SW into the north-eastern corner of moat feature 2. Feature survives as a subtle depression 6.8m long and 7.2m wide at its widest with a maximum depth of 0.3m. Seemingly acts as a drain into the moat and is therefore probably medieval or early post-medieval in origin.	419105, 288392 to 419101, 288385	
5	Linear ditch feature running into moat 7m east of moat's northern corner. Max dimensions 10m long, 0.6m deep and 7.2m wide. Interpreted as drainage ditch feeding water into moat and therefore medieval or early post-medieval in origin.	419052, 288422 to 419046, 288412	
6	Terraced area occupying area within the existing remains of medieval moat feature 2. Maximum width of 100m, interpreted as the building terrace for the medieval and post-medieval Coleshill Manor.	Centred on 419051, 288354	See plate 1
7	Terraced area surrounding the outer edge of remains of moat feature 2. Lies to the north of moat and is bordered at its northern edge by embankment feature 1. Has a maximum width of 40m and is truncated by a field boundary to its west and highway to its east. Interpreted as terrace associated with the medieval and post-medieval Coleshill Manor.	Centred on 419074, 288414	See plate 2

Figures

Figure 6: Site location



CN020 Site boundary

Date:	29/08/13	Revision Number:	0
Scale:	1:5000 at A4	Illustrator:	KJF
Path:	X:\PROJECTS\86254\GIS\FigsMXD\Sketch Survey\CN020		

Figure 7: LiDAR interpretation results

CN020 Site boundary
WA19.17
WA19.22

Date:	29/08/13	Revision Number:	0
Scale:	1:2000 at A4	Illustrator:	KJF
Path:	X:\PROJECTS\86254\GIS\FigsMXD\Sketch Survey\CN020		

Figure 8: Sketch survey results

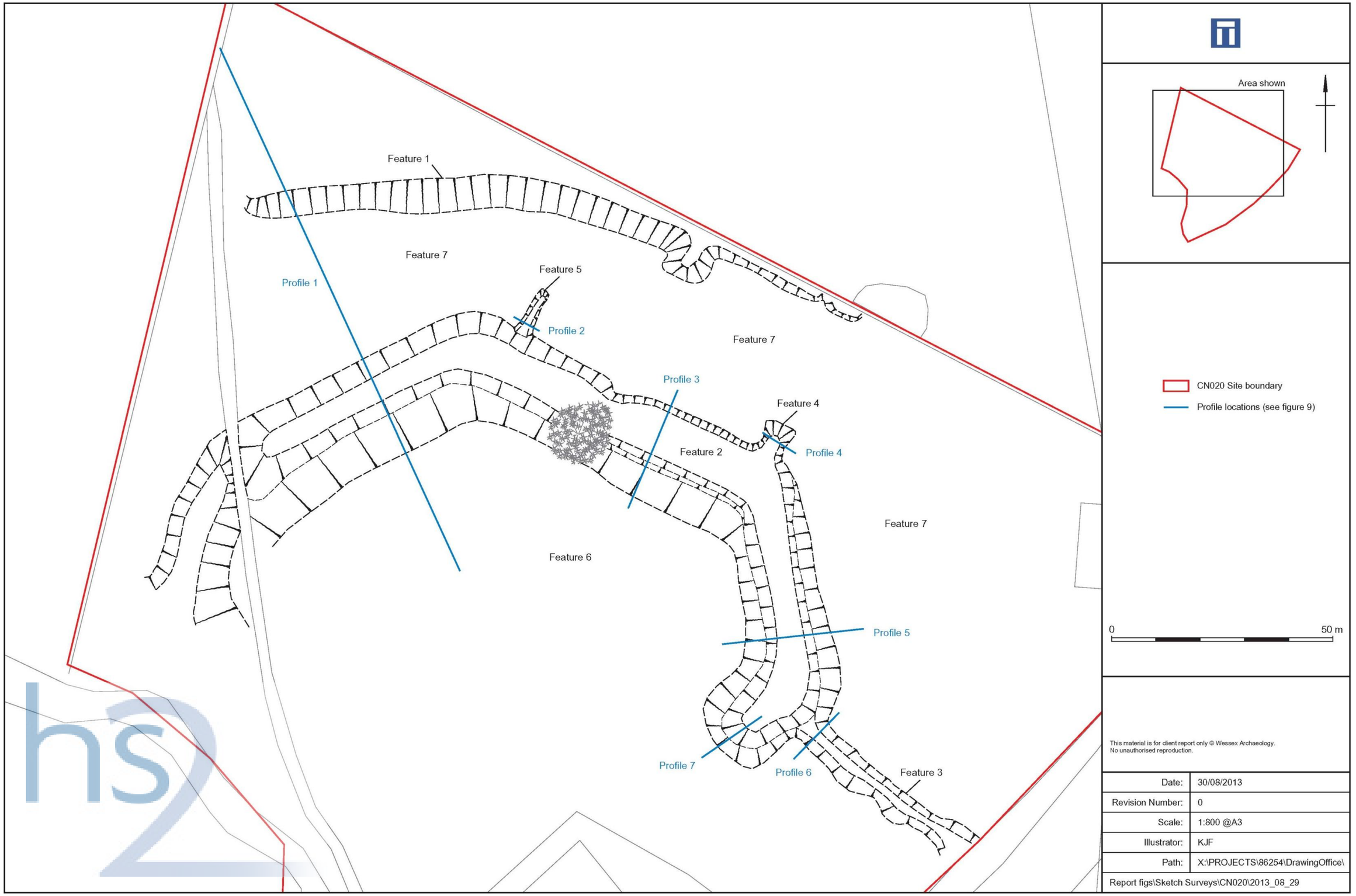
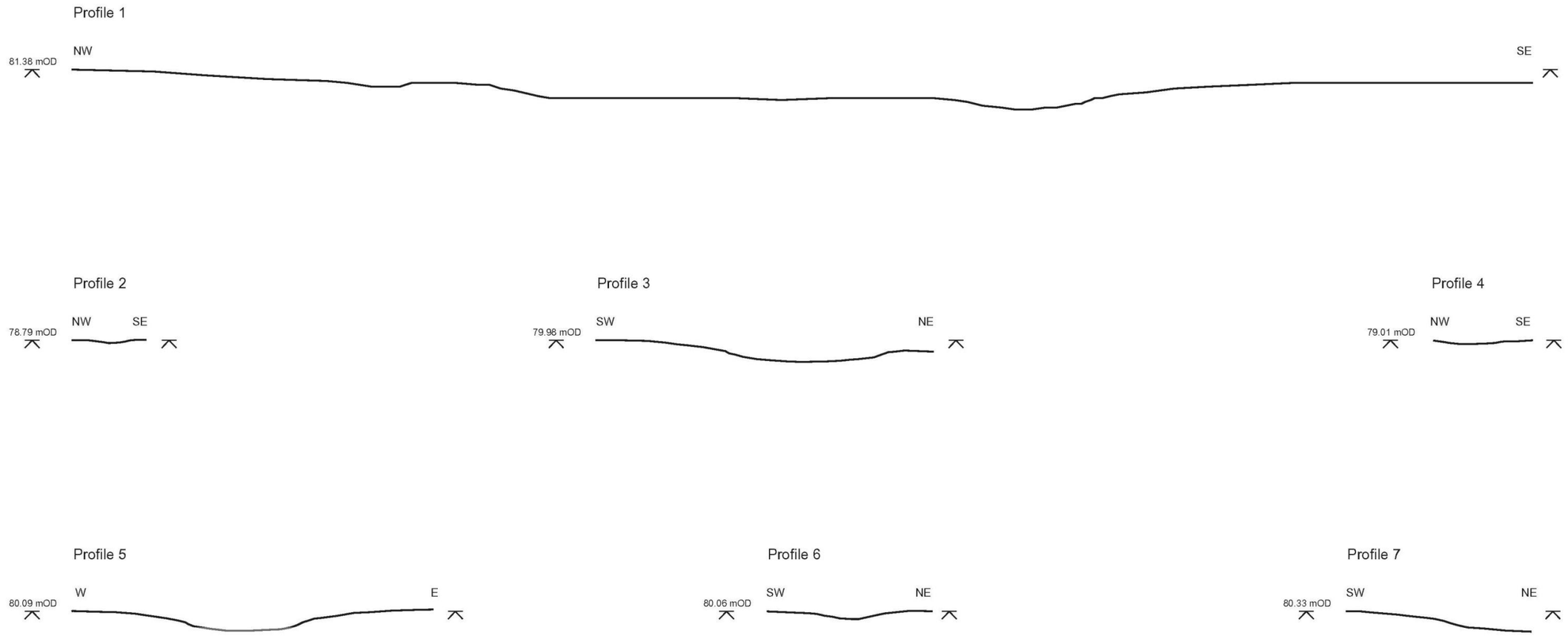


Figure 9: Feature profiles



0 10 20 m

Date:	29/08/13	Revision Number:	0
Scale:	1:400 @A3	Illustrator:	KJF
Path:	X:\PROJECTS\86254\Drawing Office\Report figs\Sketch Surveys\CN020\2013_08_29		

Plates

Figure 10: Plate 1

Plate 1: South facing view across site with noting terrace feature 7 in the foreground and modern track way to the right of photograph

Date:	28/08/2013	Revision Number:	1.0
Scale:	not to scale	Illustrator:	CB
Path:	S:\PROJECTS\66254 (HS2 Geophysics)\Sketch Survey_CN020\Photos		

Figure 11: Plate 2

Plate 2: Panoramic shot looking North across building terrace, feature 6

Date:	28/08/2013	Revision Number:	1.0
Scale:	not to scale	Illustrator:	CB
Path:	S:\PROJECTS\86254 (HS2 Geophysics)\Sketch Survey_CN020\Photos		

Figure 12: Plates 3 and 4

Plate 3: South-west facing view of modern track-way built across moat, feature 2

Plate 4: - North-west facing view of eastern arm of moat, feature 2

Figure 13: Plate 5

Plate 5: South-east facing view of intersection between moat feature 2 and drain feature 3

Date:	28/08/2013	Revision Number:	1.0
Scale:	not to scale	Illustrator:	CB
Path:	S:\PROJECTS\86254 (HS2 Geophysics)\Sketch Survey_CN020\Photos		

This material is for client report only © Wessex Archaeology. No unauthorised reproduction.

Date:	28/08/2013	Revision Number:	1.0
Scale:	not to scale	Illustrator:	CB
Path:	S:\PROJECTS\86254 (HS2 Geophysics)\Sketch Survey_CN020\Photos		

4 Geophysical surveys

4.1 CN020 Land off Birmingham Road (B4114), near Coleshill, Warwickshire

Introduction

Project Background

4.1.1 Wessex Archaeology was commissioned by Atkins, on the behalf of HS2, to carry out a geophysical survey of area CN020 off Birmingham Road (B4114) near Coleshill, Warwickshire (Figure 14), hereafter "the Site" (centred on NGR 419058 288354). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of the proposed development of HS2.

4.1.2 This Site, CN020, was selected for geophysical survey in order to provide a clearer understanding of medieval earthworks and antecedents.

Site details

4.1.3 The Site comprises one field located off Birmingham Road (B4114) and lies approximately 1km west of the centre of Coleshill. The limits of the geophysical survey area are defined by modern field boundaries for much of the area with the southern limits defined by Birmingham Road and the western limit defined by the River Cole. Geophysical survey was undertaken over the field with data coverage of around 2.5ha of a proposed 4ha; the survey was not completed due to the presence of animals on site.

4.1.4 The Site lies on an area of relatively flat land between 80m aOD (above Ordnance Datum) and 85m aOD. The land falls below 80m aOD along the bank of the River Cole to the west.

4.1.5 The solid geology is recorded as Keuper marl (Triassic) (Ordnance Survey 1957). The superficial deposits recorded on Site and close by are river terrace deposits, alluvium and glacial deposits (Ordnance Survey 1977). The soils underlying most of the Site are likely to be typical stagnogley soils of the 711b (Brockhurst 1) association. The soils close to the River Cole are recorded as pelo-alluvial gley soils of the 813b (Fladbury 1) association (SSEW 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

Archaeological Background

4.1.6 For a detailed assessment of the known archaeology of the Site and surrounding area the relevant DBA should be consulted.

4.1.7 The most significant record within the survey area relates to a medieval moated site named Coleshill Hall. The record mentions the moat is visible as an earthwork although no structures are visible inside it; a causeway is recorded across the northwest side but this is considered to be modern. The moat ditch, now dry, has been damaged by ploughing but is recorded to measure on average 18m across and 1m deep; the river is considered to possibly represent a part of the moat. The manor of Coleshill is mentioned in documentary sources from the 11th century onwards and this site is considered the likely location of the hall (MWA289). A medieval deer park is recorded in this area from 1483 and was not disparked until around 1812 (MWA3683).

4.1.8 The other significant remains on site belong to the present farm with a Grade II listed farmhouse, stable block and barn dating from the 17th century (MWA12226 and MWA12715).

Methodology

Survey Objectives

4.1.9 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology which outlined the aims of the survey and the proposed methodology to be followed (Wessex Archaeology 2013). The stated aims include the following:

- to conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- to clarify the presence/absence and extent of any buried archaeological remains within the site; and
- to determine the general nature of the remains present.

4.1.10 This report presents a brief description of the methodology followed, the detailed survey results and the archaeological interpretation of the geophysical data.

Survey Dates

4.1.11 A detailed gradiometer survey was carried out by Wessex Archaeology's in-house geophysics team on 23rd May 2013.

Grid Location

4.1.12 The individual survey grid nodes were established at 30m x 30m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02m and therefore exceeds English Heritage recommendations (EH 2008).

4.1.13 A representative sample of survey grid nodes (around 10%) were re-surveyed in the mornings in the event they were left out in the field overnight. This was undertaken along with a visual inspection of entire lines of grid nodes to ensure the survey grid remained accurate for the entire survey.

Instruments Used and Survey Method

4.1.14 The magnetometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. Data were collected at 0.25m intervals along transects spaced 1m apart with an effective sensitivity of 0.03nT, in accordance with EH guidelines (EH 2008).

4.1.15 Data were collected in the zigzag method with grids oriented north to south (Grid North). The first direction walked for each grid was heading towards the north.

Data Processing

4.1.16 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse (ZMT) function (±7nT thresholds) applied to correct for any variation between the two Bartington sensors used, and a de-step function to account for variations in traverse position due to varying ground cover and topography. The deslope function was applied to selected grids to balance out minor grid edge errors that were created by the ZMT function. These three steps were applied to all survey data, with no interpolation applied.

4.1.17 Further details of the geophysical and survey equipment, methods and processing are described in Appendix 1.

Data Presentation

4.1.18 The processed gradiometer data were output as .png image files and georeferenced in CAD (AutoCAD Map 3D 2011); these images were exported as georeferenced .png image files (accompanied by .pgw files). The interpretation layers were digitised in CAD and the resulting interpretation layers were exported as ESRI shapefiles, in accordance with the specification. The data images and interpretation shapefiles were then passed to our graphics team who produced the final figures in GIS (ESRI ArcMap 10).

4.1.19 The gradiometer data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots. The XY trace plot images have been produced at a scale of 1:1250.

Results

Introduction

4.1.20 The gradiometer survey has been successful in identifying anomalies of likely and possible archaeological interest, along with numerous trends. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1250 (Figure 15 and Figure 16).

4.1.21 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 17). Full definitions of the interpretation terms used in this report are provided in Appendix 2.

4.1.22 Numerous ferrous anomalies are visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

Interpretation: Archaeology

4.1.23 The features of greatest interest lie within the moat that is visible on Site as an earthwork. It is defined in the data as a very weakly negative anomaly (less than -0.25nT) at 4000 and 4003 with the edges of the moat defined by linear positive anomalies at some sections such as at 4002. The eastern section of the moat at 4001 is defined by spreads of increased magnetic response either side of it. The moat forms a partial octagonal shape that appears to be fairly symmetrical in plan. The weak response from the moat is perhaps partly due to it still existing as an earthwork and partly because it may well have been regularly cleaned during its use to prevent it silting up; this would prevent the accumulation of magnetically enhanced deposits. The moat has been classed as possible archaeology (very weak response) due simply to its very weak anomaly; it is extremely likely to be of archaeological interest.

4.1.24 There are a cluster of positive anomalies around 4000, within the moat ditch itself, with magnetic values over +3nT. These anomalies are located along the centre of the northeast facing section of the moat and they line up with a linear "passage" inside the moat; these features are considered to represent an entrance/bridge across the moat and are classed as archaeology. Another similar group of features is present at 4003 along the western facing section of the moat that might have a similar function.

4.1.25 The passage inside the moat, mentioned above, is defined by weakly positive linear anomalies (less than +3nT) on either side with areas of increased magnetic response along part of the length of the passage (4004). The weak positive responses are considered to represent cut features such as ditches and are considered to be of likely archaeological interest. The area of increased response around 4004 forms a rough cross shape in the centre of the passage, this may represent metalling for a pathway made up of ceramic material or may represent a more substantial brick built feature. Either side of this cross-shaped area are linear features made up of elongated spreads increased magnetic response at 4007 and 4008; these are considered to represent brick walls. The double wall at 4007 appears to form another passageway running parallel to the previous one.

4.1.26 The walls and ditches discussed above appear to form a symmetrical square enclosure measuring roughly 34.5m across, aligned roughly northeast to southwest. This enclosure appears to be sub-divided into four small squared areas measuring around 14m across by the area of increased response and the passage around 4004. These small squared areas, such as 4005 and 4006, are notable as they are relatively free from ferrous/ceramic responses. There are at least two entrances into this enclosure to the northeast and southwest and a possible third at 4008 based on some positive anomalies that interrupt the wall here; it is possible that there are four entrances into this enclosure at each end of the cross-shaped path. This area is considered to represent an open area rather than a building and this may indicate that this area is a walled garden given its proximity and alignment to the possible entrance across the moat.

4.1.27 The area to the west of this enclosed area at 4009 by contrast is far from symmetrical with positive anomalies running at various alignments across the area. It is possible that these features may not all be contemporary and they are all considered to represent cut features such as ditches of likely archaeological interest.

4.1.28 The area to the immediate southwest of the squared enclosure appears relatively clear but as the extents of the geophysical survey stop here it is difficult to work out what is going on here. Further to the southwest, dense spreads of increased magnetic response and ferrous responses around 4011 and 4012 are present in addition to a regular pattern of ditches sub-dividing the area. These ditches have positive magnetic values exceeding +3nT in places with other weaker examples noted that have values less than +3nT. The concentration of bipolar and dipolar anomalies in this area might suggest that there are buildings in this area or there was at least a concentration of activity here based on the quantity of magnetic debris at this location.

4.1.29 There are anomalies of likely and possible archaeological interest outside the moat including a probable ditch at 4013, a short section of possible ditch at 4014 and a pit-like anomaly at 4015. All of these anomalies have positive magnetic values with 4013 possessing values less than +2nT and 4014 and 4015 with values exceeding +3nT.

4.1.30 There are spreads of bipolar and dipolar anomalies, termed increased magnetic response, in many areas of the survey area. These are thought to be the result of concentrations of ceramic or ferrous debris of unknown date. The biggest area outside of the moat is at 4016 and contains a number of positive anomalies of possible archaeological interest. It is not possible to determine whether these spreads are archaeological or not with any certainty due simply to the fact that modern ceramic debris will create near identical responses to archaeological

ceramic debris. However, past experience has shown these areas can sometimes correspond to areas of activity, rubbish disposal or settlement.

4.1.31 There is a linear spread of increased response at 4017. This is not considered to represent an archaeological feature and corresponds closely with the position of a track marked on maps.

4.1.32 There are numerous trends scattered throughout the data, most are considered to be of uncertain origin such as those around 4007. These trends may prove to be archaeological but there is not enough patterning in their spatial distribution to allow a more conclusive interpretation. Other trends are easier to identify with ploughing scars visible around 4018 and a possible ceramic field drain at 4019.

4.1.33 The remaining anomalies are small sub-circular or sub-oval shaped positive anomalies that may prove to be of archaeological interest. These anomalies could represent anything from cut features such as postholes to data spikes and ferrous anomalies. These anomalies form no significant patterning in their spatial distribution and have been termed possible archaeology as a result.

Interpretation: Modern Services

4.1.34 There are no modern services identified in the survey area however an overhead electricity pylon crosses the eastern edge of the site.

4.1.35 Gradiometer data will not be able to locate and identify all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

Conclusions

Introduction

4.1.36 The detailed gradiometer survey has been successful in detecting anomalies of likely and possible archaeological interest within the Site, in addition to regions of increased magnetic response, the presence of a ceramic field drain and numerous trends of uncertain origin.

Discussion

4.1.37 The data shows that the moat corresponds to a settlement area and based on the results it seems clear that the interior was carefully divided and arranged based on a fairly symmetrical ground plan. An entrance to the site may have existed along the northeast facing section of the moat and led into a square enclosure that may have served as a garden leading towards the main house that may be located further southwest. The areas either side of the possible garden area may have been given over to various farm and domestic buildings vital to the day to day running of the estate.

4.1.38 The remains inside the enclosure may indicate that the causeway on the northwest side is perhaps older than previously considered in the HER record (MWA289).

4.1.39 The moat was not fully defined in the data due in part to the partial coverage of the survey but it seems to be octagonal in shape. Another section of it may exist in the River Cole that runs past the Site to the southwest and this may have served as the water supply to keep the moat filled.

4.1.40 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be encountered than have been identified through geophysical survey. Given how weak many of the features interpreted in this data are it seems very likely that more features may be present than were detected during the survey.

References

Bibliography

English Heritage (2008), Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No. 1, 2nd Edition.

Soil Survey of England and Wales (1983), Sheet 3, Soils of Midland and Western England. Ordnance Survey: Southampton.

Ordnance Survey (1977), Quaternary Map of the United Kingdom: South. Ordnance Survey: Southampton.

Ordnance Survey (1957), Sheet 2, Geological Map of Great Britain: England and Wales. Ordnance Survey: Chessington.

Wessex Archaeology (2013), HS2: Geophysical Survey Written Scheme of Investigation. Report Reference: 86254.01.

HER Records Consulted

MWA289 – Moat at Coleshill Hall Farm

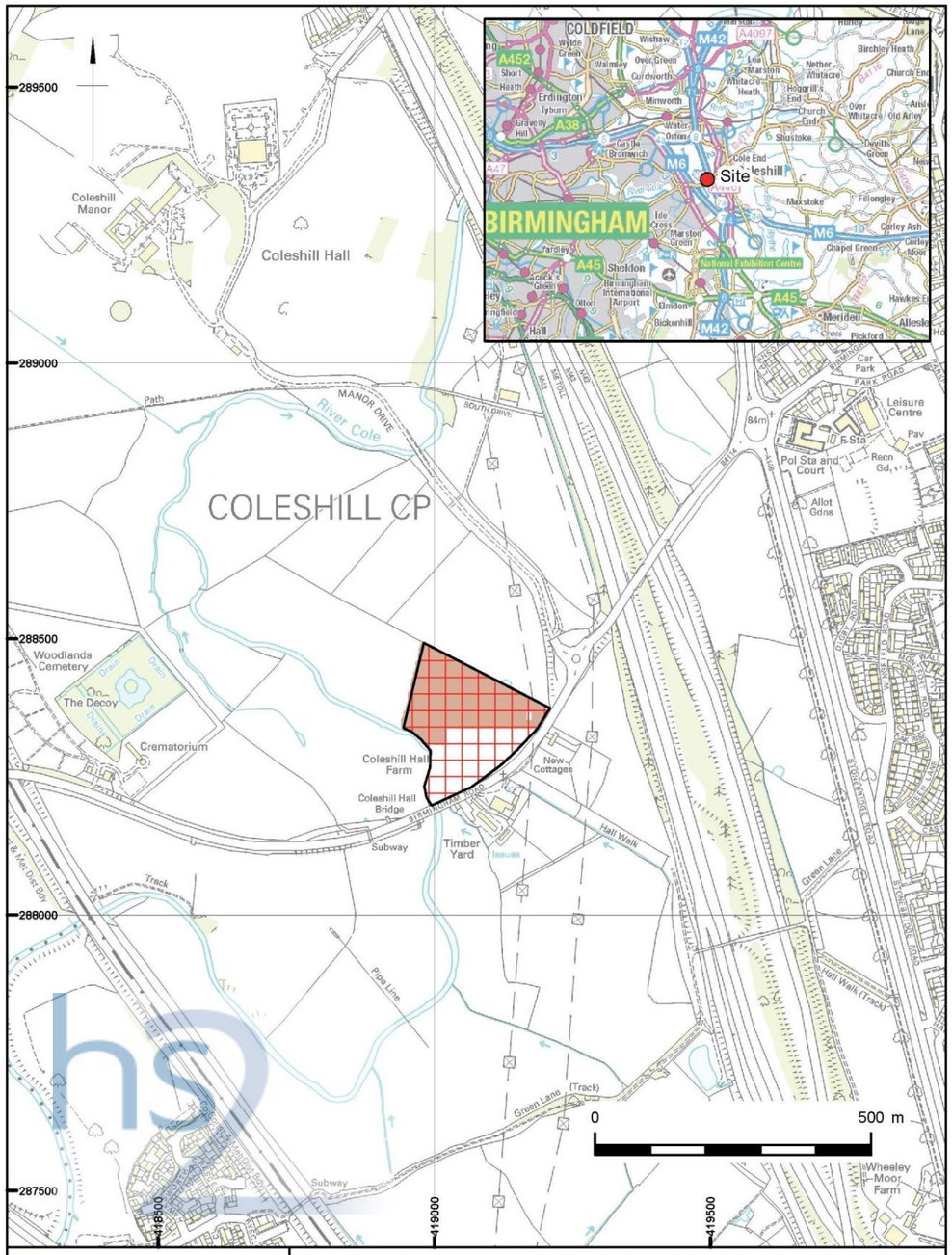
MWA3683 – Site of Coleshill Park

MWA1226 – Old Coleshall Farm Building, barn

MWA12715 – Coleshill Hall Farmhouse

Figures

Figure 14: Site location



Date:	02/09/13	Revision Number:	0
Scale:	1:10,000 at A4	Illustrator:	KJF
Path:	X:\PROJECTS\86254\GIS\FigsMXD\CN020		

Figure 15: Greyscale plot

Figure 16: XY trace

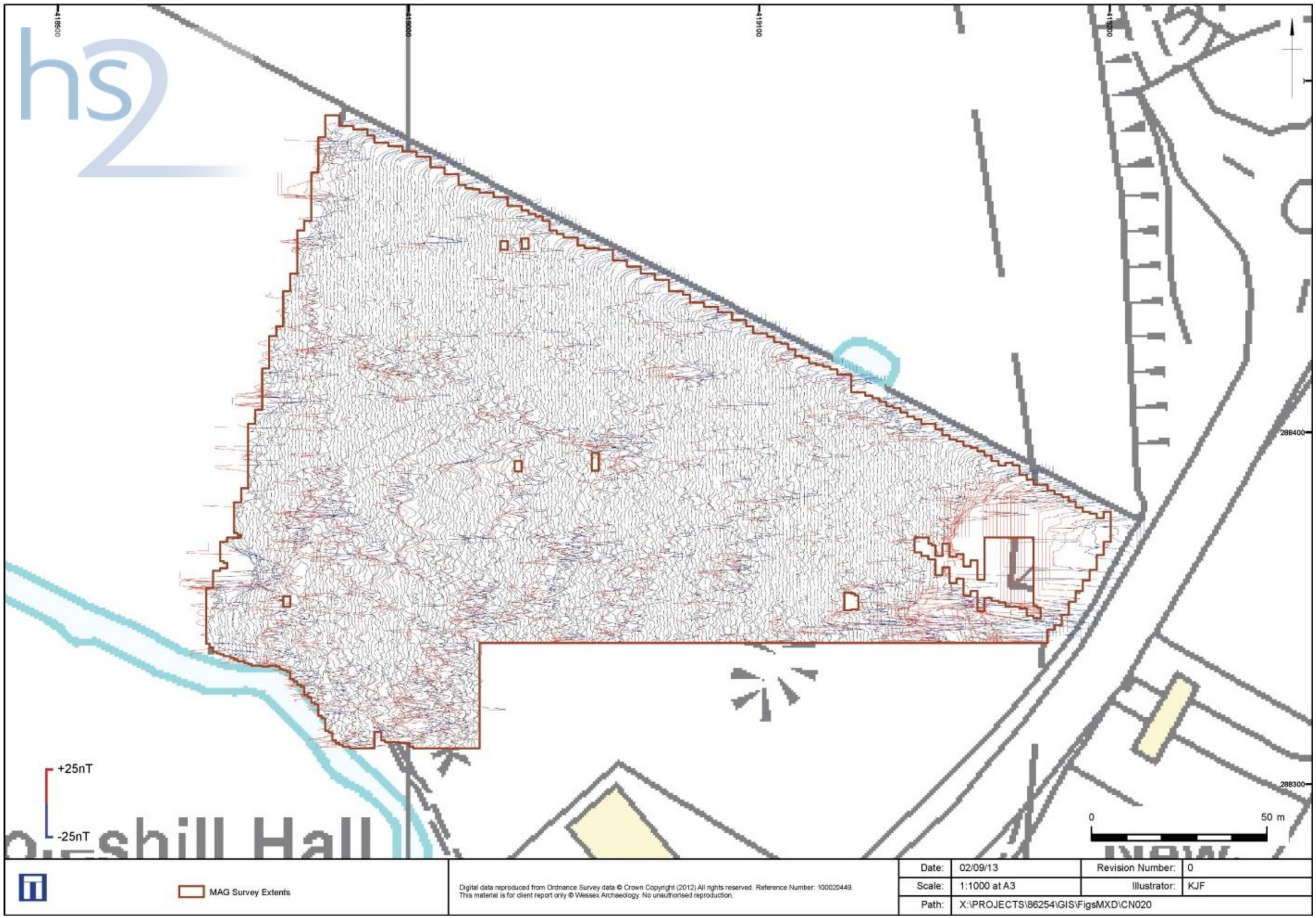
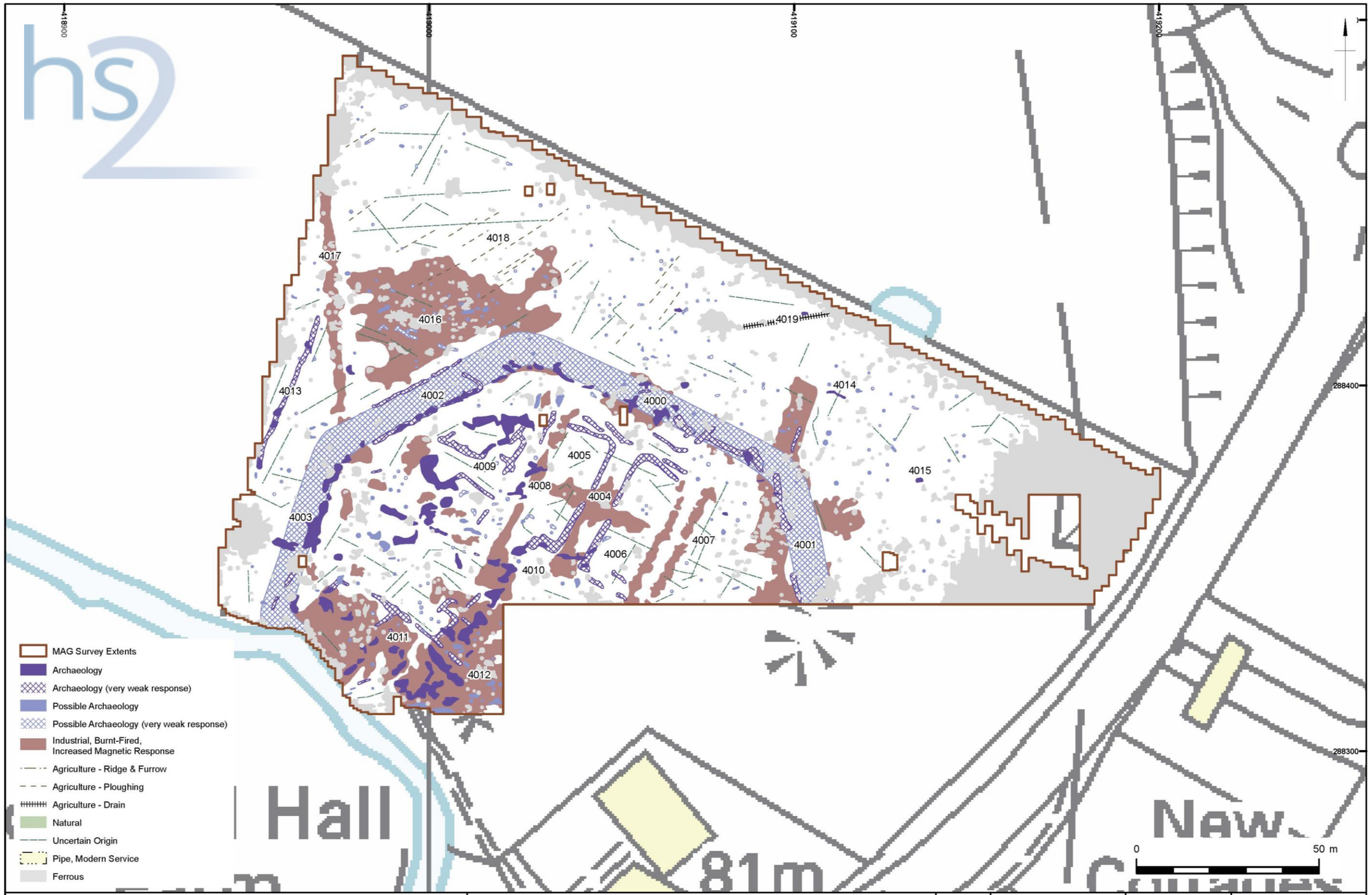


Figure 17: Interpretation



Date:	03/09/13	Revision Number:	0
Scale:	1:1000 at A3	Illustrator:	KJF
Path:	X:\PROJECTS\86254\GIS\FigsMXD\CN020		

4.2 CN022 Land off Manor Drive, between Kingshurst and Coleshill, Warwickshire

Introduction

Project Background

4.2.1 Wessex Archaeology was commissioned by Atkins, on the behalf of HS2, to carry out a geophysical survey of area CN022 off Manor Drive, near Coleshill, Warwickshire (Figure 18), hereafter "the Site" (centred on NGR 418880 288675). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of the proposed development of HS2.

4.2.2 This Site, CN022, was selected for geophysical survey in order to determine the extent of remains associated with medieval activity and a known cropmark complex.

Site Details

4.2.3 The Site is comprised of two fields off Manor Drive and lies approximately 1km west of the centre of Coleshill. The limits of the geophysical survey area are defined by modern field boundaries for much of the area with part of the western limit defined by the client. To the north of the survey area is a road, Manor Drive. Geophysical survey was undertaken over as much of the field as was accessible, a total of 5.4 ha.

4.2.4 The Site lies on an area of relatively flat land on the floodplain of the river Cole at a height a little over 80m aOD (above Ordnance Datum). The north-eastern extent of the survey area is defined by Manor Drive, with further agricultural land surrounding the other three sides. Coleshill Manor lies 700m to the north, a moated site at Coleshill Hall Farm some 350m to the south and a former duck decoy 500m to the southwest.

4.2.5 The solid geology is recorded as Keuper marl (Triassic) (Ordnance Survey 1957). The superficial deposits recorded on Site and close by are river terrace deposits, alluvium and glacial deposits (Ordnance Survey 1977). The soils underlying most of the Site are likely to be gleyic brown earths of the 543 (Arrow) association. The eastern edge of the site was not surveyed by the soil survey as it was considered to be largely urban or industrial (SSEW 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

Methodology

Survey Objectives

4.2.6 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology which outlined the aims of the survey and the proposed methodology to be followed (Wessex Archaeology 2013). The stated aims include the following:

- to conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- to clarify the presence/absence and extent of any buried archaeological remains within the site; and
- to determine the general nature of the remains present.

4.2.7 This report presents a brief description of the methodology followed, the detailed survey results and the archaeological interpretation of the geophysical data.

Survey Dates

4.2.8 A detailed gradiometer survey was carried out by Wessex Archaeology's in-house geophysics team on 19th and 20th August 2013.

Grid Location

4.2.9 The individual survey grid nodes were established at 30m x 30m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02m and therefore exceeds English Heritage recommendations (EH 2008).

4.2.10 A representative sample of survey grid nodes (around 10%) were re-surveyed in the mornings in the event they were left out in the field overnight. This was undertaken along with a visual inspection of entire lines of grid nodes to ensure the survey grid remained accurate for the entire survey.

Instruments Used and Survey Method

4.2.11 The magnetometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. Data were collected at 0.25m intervals along transects spaced 1m apart with an effective sensitivity of 0.03nT, in accordance with EH guidelines (EH 2008).

4.2.12 Data were collected in the zigzag method with grids oriented north to south (Grid North). The first direction walked for each grid was heading towards the north.

Data Processing

4.2.13 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse (ZMT) function (±5nT thresholds) applied to correct for any variation between the two Bartington sensors used, and a de-step function to account for variations in traverse position due to varying ground cover and topography. These two steps were applied to all survey data, with no interpolation applied.

4.2.14 Further details of the geophysical and survey equipment, methods and processing are described in Appendix 1.

Data Presentation

4.2.15 The processed gradiometer data were output as .png image files and georeferenced in CAD (AutoCAD Map 3D 2011); these images were exported as georeferenced .png image files (accompanied by .pgw files). The interpretation layers were digitised in CAD and the resulting interpretation layers were exported as ESRI shapefiles, in accordance with the specification. The data images and interpretation shapefiles were then passed to our graphics team who produced the final figures in GIS (ESRI ArcMap 10).

4.2.16 The gradiometer data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots. The XY trace plot images have been produced at a scale of 1:1,500.

Results

Introduction

4.2.17 The gradiometer survey has been successful in identifying anomalies of possible archaeological interest, along with numerous trends. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1,500 (Figures 19 to 21).

4.2.18 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 21). Full definitions of the interpretation terms used in this report are provided in Appendix 2.

4.2.19 Numerous ferrous anomalies are visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

Interpretation: Archaeology

4.2.20 Towards the western extent of the Site, a small region of increased magnetic response 4000 is visible adjacent to the existing field boundary. The response is relatively broad and poorly defined, typical of anomalies associated natural features. Several pit-like anomalies are visible near 4000, although it is difficult to determine their origins and therefore they have been classified as being of possible archaeological interest; it is conceivable that such anomalies relate to natural features such as tree throws or solution hollows, however.

4.2.21 Broad anomalies 4001 appear are not clearly defined from the general magnetic background and are consistent with natural features. It is possible that they represent the remnants of a former channel, particularly given their location close to the river Cole.

4.2.22 Towards the eastern extent of the Site, a cluster of possible pit-like anomalies 4003 lies within a region of increased ferrous debris. It is possible that these pit-like responses are archaeological in origin, although little coherency can be seen within their distribution.

4.2.23 Two larger pit-like anomalies 4004 appear towards the southern extent of the Site. Whilst not characteristically archaeological in origin, their relatively large size suggests that they may be of some interest.

4.2.24 Towards the southern boundary, further pit-like anomalies have been identified. They are not conclusively archaeological in origin, although it is possible that they are of some interest.

4.2.25 Elsewhere, linear and curvilinear trends are apparent. Some of these are more clearly associated with ploughing and other agricultural activity at the site; some of these are regularly spaced although it is unclear whether they relate to former ridge and furrow. Trends such as those around 4005 lie on other orientations may be archaeological in origin, although it is perhaps more likely that they relate to near-surface geological changes or agricultural activity.

Conclusions

Introduction

4.2.26 The detailed gradiometer survey has been successful in detecting anomalies of possible archaeological interest within the Site, in addition to regions of natural responses and numerous trends of uncertain origin.

Discussion

4.2.27 No anomalies have been identified that are considered to be of definite or likely archaeological interest. The majority of anomalies of possible archaeological interest comprises isolated pit-like anomalies, and it is difficult to be certain as to their archaeological potential given the general lack of coherency in their distribution.

4.2.28 Most of the ploughing trends are oriented parallel with the existing boundaries aligned NE-SW. It is possible that they date from any period from the medieval through to the present day.

4.2.29 The magnetic background of the southern field is notably noisier, with more frequent ferrous responses. This is likely to reflect different land use and agricultural practices. It is also possible that the southern field has been used as paddocks, resulting in increased amounts of iron or steel debris within the topsoil.

References

Bibliography

English Heritage (2008), Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No. 1, 2nd Edition.

Soil Survey of England and Wales (1983), Sheet 3, Soils of Midland and Western England. Ordnance Survey: Southampton.

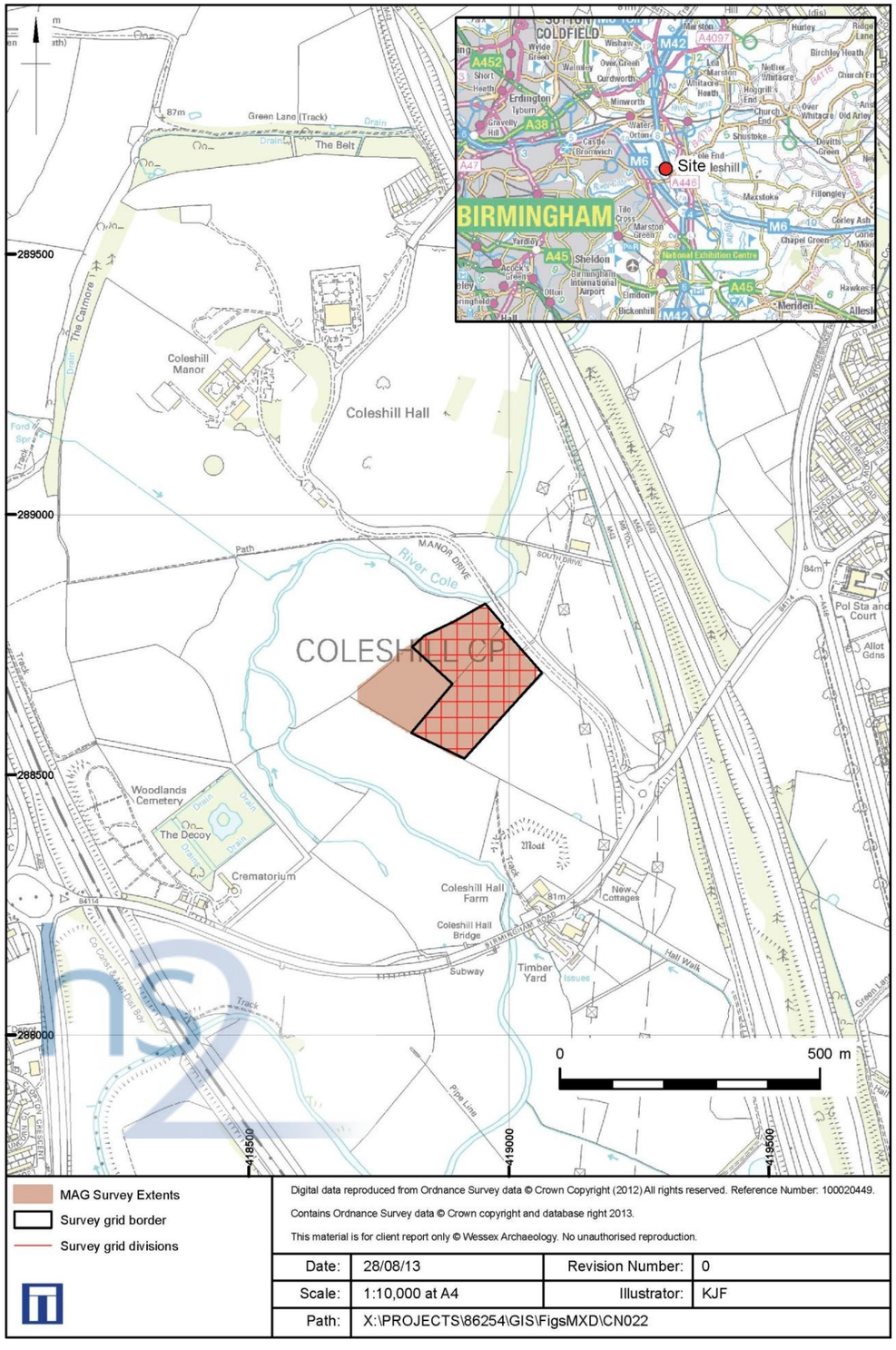
Ordnance Survey (1977), Quaternary Map of the United Kingdom: South. Ordnance Survey: Southampton.

Ordnance Survey (1957), Sheet 2, Geological Map of Great Britain: England and Wales. Ordnance Survey: Chessington.

Wessex Archaeology (2013), HS2: Geophysical Survey Written Scheme of Investigation. Report Reference: 86254.01.

Figures

Figure 18: Site location



Date:	28/08/13	Revision Number:	0
Scale:	1:10,000 at A4	Illustrator:	KJF
Path:	X:\PROJECTS\86254\GIS\FigsMXD\CN022		

Figure 19: Greyscale plot

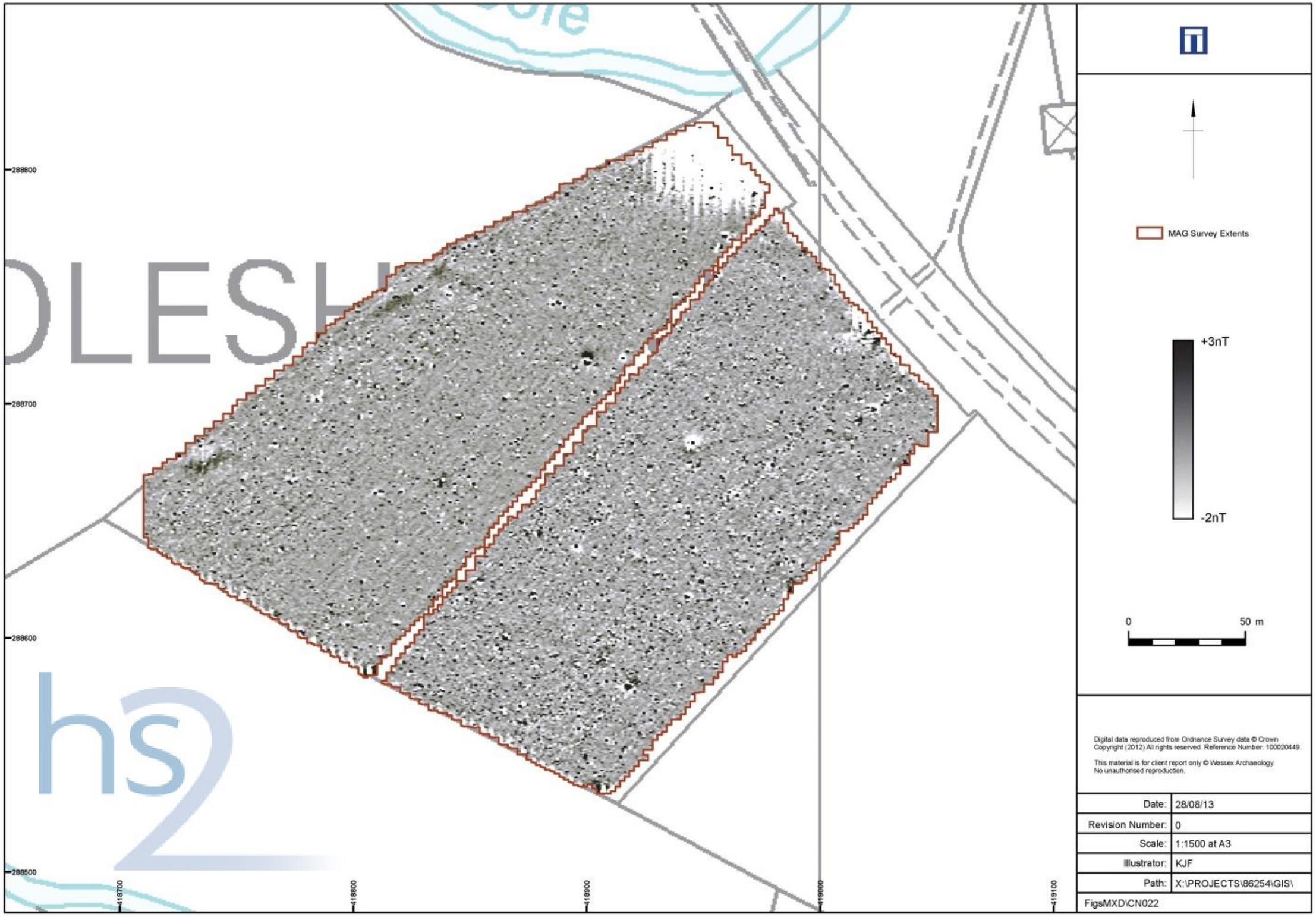


Figure 20: XY trace

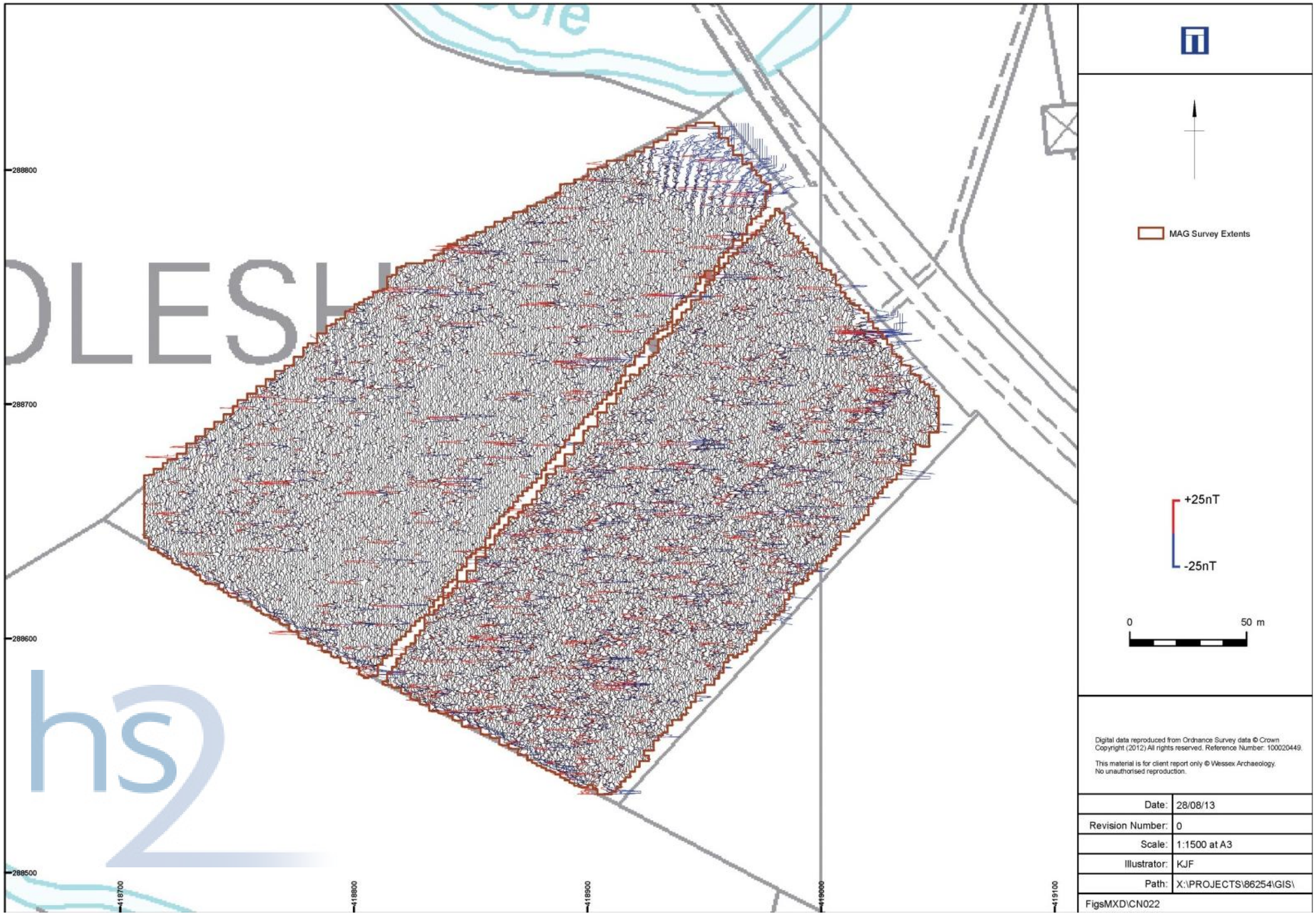


Figure 21: Interpretation

4.3 CN023 Land between Manor Drive and the M42, near Coleshill, Warwickshire

Introduction

Project Background

4.3.1 Wessex Archaeology was commissioned by Atkins, on the behalf of HS2, to carry out a geophysical survey of area CN023 off Sutton Road (A453), near Drayton Bassett, Staffordshire (Figure 18), hereafter "the Site" (centred on NGR 419147 288799). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of the proposed development of HS2.

4.3.2 This Site, CN023, was selected for geophysical survey in order to determine the extent of remains associated with medieval activity and a known cropmark complex.

Site details

4.3.3 The Site comprises one field located between Manor Drive and the M42 and lies approximately 0.8km west of the centre of Coleshill. The limits of the geophysical survey area are defined by modern field boundaries. To the northwest of the survey area is the River Cole and roads on the remaining sides of the site. The Site lies on an area of gently sloping land that rises from less than 80m aOD (above Ordnance Datum) at the north to a little under 85m aOD at the south of the Site. The area of data coverage came to around 4.8ha.

4.3.4 The solid geology is recorded as Keuper marl (Triassic) (Ordnance Survey 1957). The superficial deposits recorded on Site and close by are alluvium, sand, gravel and glacial deposits (Ordnance Survey 1977). The soils underlying most of the Site are likely to be gleyic brown earths of the 543 (Arrow) association. The soils close to the River Cole are recorded as pelo-alluvial gley soils of the 813b (Fladbury 1) association (SSEW 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

Archaeological Background

4.3.5 There is one record of an archaeological site within the survey area which is a medieval cropmark enclosure (MWA4846). For a full account of the recorded heritage assets the appropriate Desk-Based Assessment (DBA) should be consulted.

Methodology

Survey Objectives

4.3.6 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology which outlined the aims of the survey and the proposed methodology to be followed (Wessex Archaeology 2013). The stated aims include the following:

- to conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- to clarify the presence/absence and extent of any buried archaeological remains within the site; and
- to determine the general nature of the remains present.

4.3.7 This report presents a brief description of the methodology followed, the detailed survey results and the archaeological interpretation of the geophysical data.

Survey Dates

4.3.8 A detailed gradiometer survey was carried out by Wessex Archaeology's in-house geophysics team between the 21st and 22nd August 2013.

Grid Location

4.3.9 The individual survey grid nodes were established at 30m x 30m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02m and therefore exceeds English Heritage recommendations (EH 2008).

4.3.10 A representative sample of survey grid nodes (around 10%) were re-surveyed in the mornings in the event they were left out in the field overnight. This was undertaken along with a visual inspection of entire lines of grid nodes to ensure the survey grid remained accurate for the entire survey.

Instruments Used and Survey Method

4.3.11 The magnetometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. Data were collected at 0.25m intervals along transects spaced 1m apart with an effective sensitivity of 0.03nT, in accordance with EH guidelines (EH 2008).

4.3.12 Data were collected in the zigzag method with grids oriented north to south (Grid North). The first direction walked for each grid was heading towards the north.

Data Processing

4.3.13 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse (ZMT) function (±15nT thresholds for most grids) applied to correct for any variation between the two Bartington sensors used, and a de-step function to account for variations in traverse position due to varying ground cover and topography. The deslope function was also used, before the de-step, to correct errors that resulted from imperfections in the ZMT function. These three processing steps were applied to all survey data, with no interpolation applied.

4.3.14 Further details of the geophysical and survey equipment, methods and processing are described in Appendix 1.

Data Presentation

4.3.15 The processed gradiometer data were output as .png image files and georeferenced in CAD (AutoCAD Map 3D 2011); these images were exported as georeferenced .png image files (accompanied by .pgw files). The interpretation layers were digitised in CAD and the resulting interpretation layers were exported as ESRI shapefiles, in accordance with the specification. The data images and interpretation shapefiles were then passed to our graphics team who produced the final figures in GIS (ESRI ArcMap 10).

4.3.16 The gradiometer data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots. The XY trace plot images have been produced at a scale of 1:1500.

Results

Introduction

4.3.17 The gradiometer survey has been successful in identifying anomalies of likely and possible archaeological interest, along with numerous trends and two modern services. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1500 (Figures 19 to 21).

4.3.18 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 21). Full definitions of the interpretation terms used in this report are provided in Appendix 2.

4.3.19 Numerous ferrous anomalies are visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

Interpretation: Archaeology

4.3.20 There are few anomalies of likely archaeological interest within the survey area with only one feature deemed to be of clear archaeological interest at 4000. This feature is made up of linear positive anomalies with magnetic values typically over +2nT although there are weaker regions with values less than +2nT. These features are considered to represent ditches and appear to partly define a small sub-rectangular enclosure measuring at least 10.5m in length and 4.8m in width. The eastern end of this feature is well-defined but the western end is open and as the values fade out in this direction may either represent poor survival of the feature here or simply indicates a loss in magnetic contrast. This possible enclosure is considered to be of likely archaeological significance.

4.3.21 There are other positive anomalies that may prove archaeological interest located at 4001, 4002 and 4003. The weak positive linear anomaly at 4001 is set perpendicular to the modern field boundary and is considered to be a relatively recent agricultural ditch. 4002 and 4003 are sub-oval to irregular in shape, measuring roughly 4.4m and 1.5m in length respectively. Both features have magnetic values over +3nT and have a smooth curved shape visible on the XY trace plot. These anomalies are considered to possibly represent cut features such as pits; they have been classed as possible archaeology as they are located in dense areas of ferrous responses and a non-archaeological explanation for them cannot be ruled out.

4.3.22 There are numerous agricultural features visible in the data including ploughing trends at 4006 and ceramic field drains at 4005. The remaining trends are considered to be of uncertain origin as they are set at different alignments to the ploughing and have differing forms. The curving trends at 4004 may prove to be archaeological due to their shape in plan as they are not obviously linked to modern agricultural activity.

4.3.23 The remaining anomalies of possible archaeological interest are numerous small sub-oval positive responses. They typically have values over +1.5nT and are considered to either represent cut features such as small pits and postholes or are geological features. It is not possible to be more definite in the interpretation as these features form no significant patterning in their spatial distribution.

4.3.24 There are concentrations of ferrous responses accompanied by spreads of increased magnetic response in the data, as at 4007 and 4008. These spreads are not considered to be archaeological and are likely to be formed of relatively modern metallic and ceramic debris that have either been dumped on the land or deliberately spread during agricultural activity.

4.3.25 There are three services visible in the data at 4009, 4010 and 4011; these features are discussed in more detail below. There is a line of ferrous that extends from the service at 4010 roughly towards the northeast; this is not a service and is a modern track.

Interpretation: Modern Services

4.3.26 Three modern services have been identified in the data close at 4009, 4010 and 4011. The first two services (4009 and 4010) appear to be metallic/ceramic pipes. The larger of the two pipes at 4009 (larger in terms of anomaly size in plan) runs roughly north-south through the southeast corner of the field and the second extends perpendicular to the western field boundary. Both services run beyond the extents of the survey area and most likely continue further into unsurveyed areas of this field. The third service is a pylon base at 4011 that carries overhead electricity cables across the Site.

4.3.27 It is not clear from the geophysical data whether the services identified are in active use or not. Also gradiometer data will not be able to locate and identify all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

Conclusions

Introduction

4.3.28 The detailed gradiometer survey has been successful in detecting anomalies of likely and possible archaeological interest within the Site, in addition to regions of increased magnetic response, numerous trends of uncertain origin and at least three modern services.

Discussion

4.3.29 The data shows few likely archaeological anomalies with only one small enclosure found at 4000 that might be of interest. No features were identified that can be clearly related to the cropmarks identified further south around the moated site at Coleshill Hall Farm. Two pit-like responses of possible archaeological interest were observed at 4002 and 4003.

4.3.30 This field has clearly been covered with a lot of strongly magnetised debris. This debris has magnetic values that are high enough to mask the weaker responses expected from archaeological features. This has reduced the area in which archaeological features are visible, especially in areas such as around 4007 and 4008. It may be that more archaeological features are present than were detected in the geophysical data presented in this report.

4.3.31 The relative dimensions of the modern services identified by the gradiometer survey are indicative of the strength of their magnetic response, which is dependent upon the materials used in their construction and the backfill of the service trenches. The physical dimensions of the services indicated may therefore differ from their magnetic extents in plan; it is assumed that the centreline of services is coincident with the centreline of their anomalies. It is difficult to estimate the depth of burial of the services through gradiometer survey.

4.3.32 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be encountered than have been identified through geophysical

survey. Given how weak many of the features interpreted in this data are it seems very likely that more features may be present than were detected during the survey.

References

Bibliography

English Heritage (2008), Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No. 1, 2nd Edition.

Soil Survey of England and Wales (1983), Sheet 3, Soils of Midland and Western England. Ordnance Survey: Southampton.

Ordnance Survey (1977), Quaternary Map of the United Kingdom: South. Ordnance Survey: Southampton.

Ordnance Survey (1957), Sheet 2, Geological Map of Great Britain: England and Wales. Ordnance Survey: Chessington.

Wessex Archaeology (2013), HS2: Geophysical Survey Written Scheme of Investigation. Report Reference: 86254.01.

HER Records Consulted

MWA4846 – Medieval cropmark enclosure

Figures

Figure 22: Site location

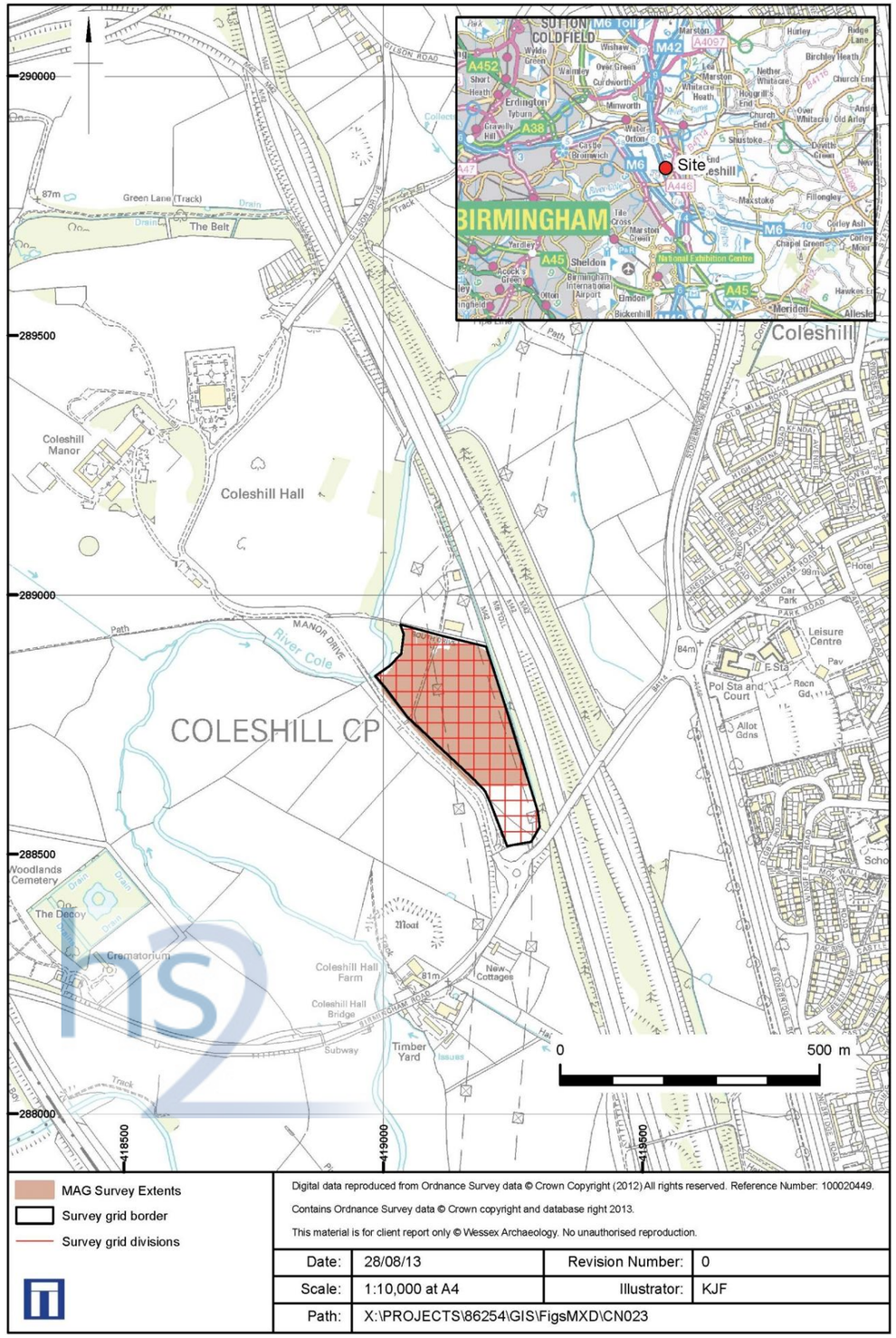


Figure 23: Greyscale plot

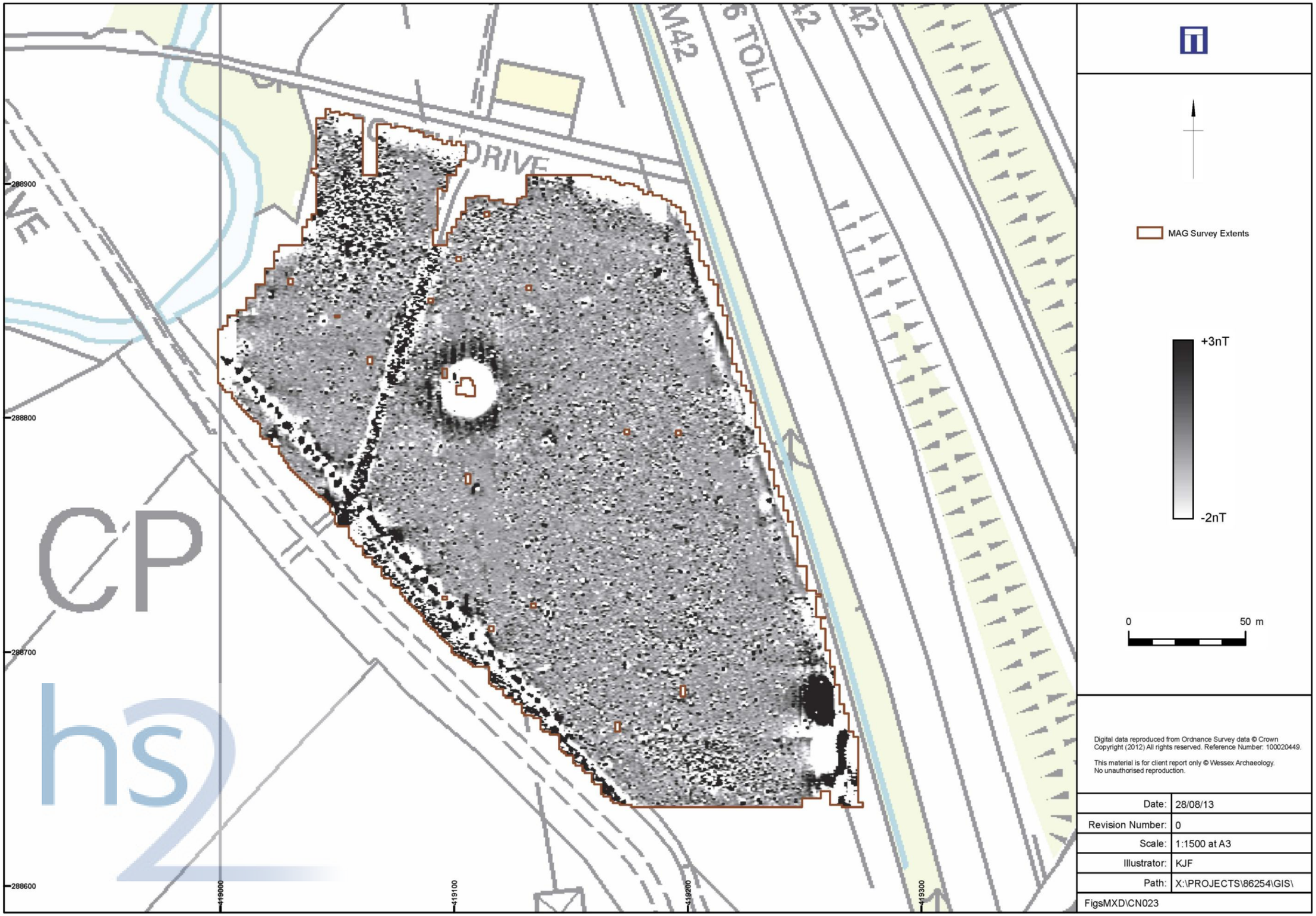
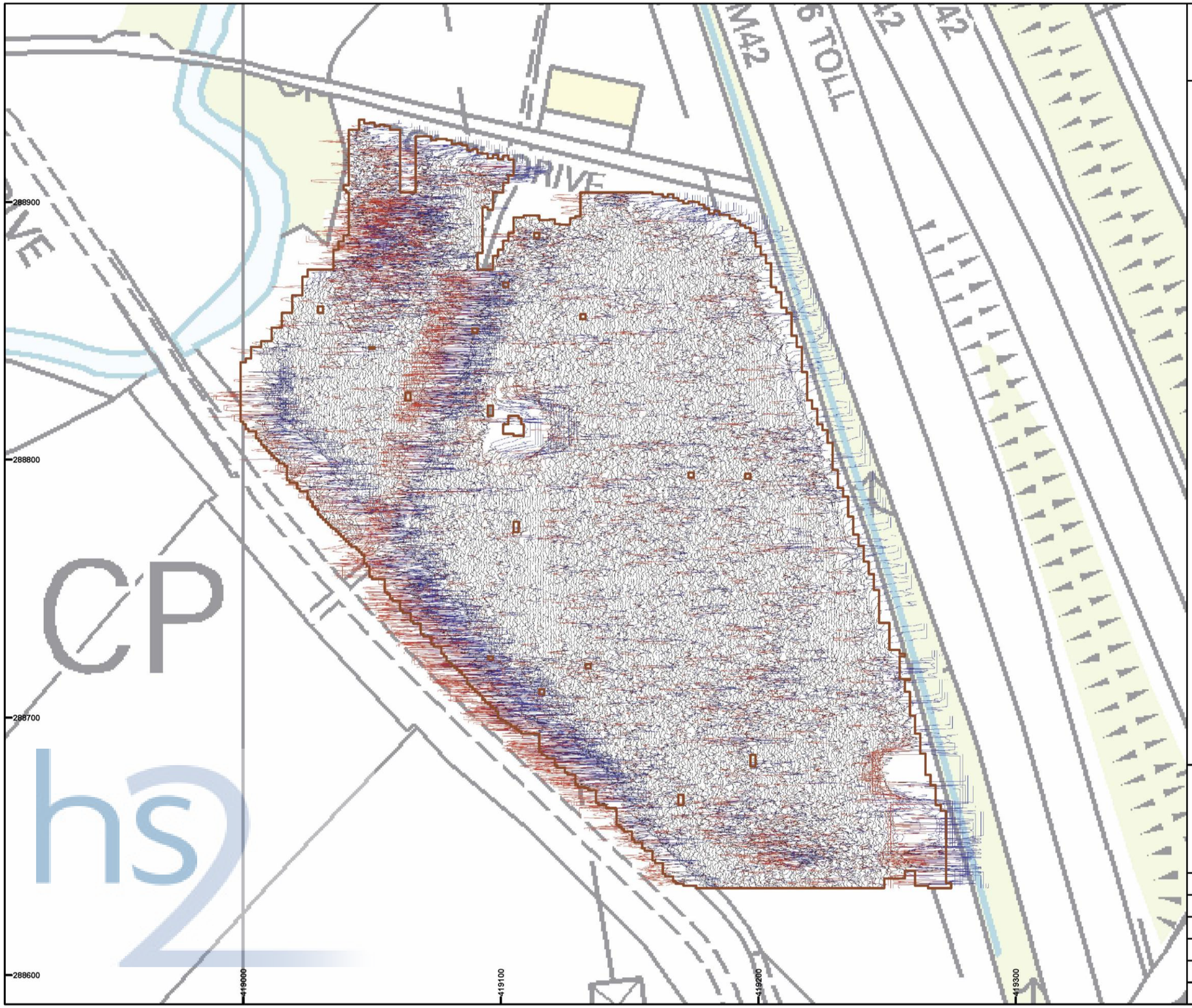


Figure 24: XY trace



Date:	28/08/13
Revision Number:	0
Scale:	1:1500 at A3
Illustrator:	KJF
Path:	X:\PROJECTS\86254\GIS\
FigsMXD\CN023	

Figure 25: Interpretation

4.4 CN025 Land off Gilson Drive, near Coleshill, Warwickshire

Introduction

Project Background

4.4.1 Wessex Archaeology was commissioned by Atkins, on the behalf of HS2, to carry out a geophysical survey of area CN025 off Gilson Drive, near Coleshill, Warwickshire (Figure 22), hereafter "the Site" (centred on NGR 419100 289679). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of the proposed development of HS2.

4.4.2 This Site, CN025, was selected for geophysical survey in order to determine the extent of remains associated with medieval activity and a known cropmark complex.

Site details

4.4.3 The Site comprises three fields off Gilson Drive and lies approximately 0.6km west of the centre of Coleshill. The limits of the geophysical survey area are defined by modern field boundaries for much of the area with the eastern limits defined by the client. To the north of the survey area is a track and to the west is a small area of wood separating this field from the M42. The area of data coverage came to around 1.5ha, only the northernmost area of the Site was surveyed – there was no access to the remainder.

4.4.4 The Site lies on an area of relatively flat land at a height a little under 75m aOD (above Ordnance Datum).

4.4.5 The solid geology of the area is recorded as Keuper marl (Triassic) with Rhaetic and Dolomitic Conglomerate (Ordnance Survey 1957). The superficial deposits recorded in the area are deposits of alluvium, boulder clay and moranic drift and glacial sand and gravel (Ordnance Survey 1977).

4.4.6 The soils underlying most of the Site are likely to be gleyic brown earths of the 543 (Arrow) association or gleyic argillic brown earths of the 572f (Whimple 3) association. The eastern edge of the site was not surveyed by the soil survey as it was considered to be largely urban or industrial (SSEW 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

Archaeological Background

4.4.7 For a detailed assessment of the known archaeology of the Site and surrounding area the relevant DBA should be consulted. A summary of the available archaeological records within 1 km of the centre of the Site has been provided here for reference with the results and interpretation of the geophysical survey.

4.4.8 The recorded archaeology in the area is dominated by Roman settlement to the north east of the Site and medieval settlement to the south-east at Coleshill. The earliest recorded site is an Iron Age settlement on Grimstock Hill (MWA 5130) but there were flint artefacts discovered in the Roman settlement on Grimstock Hill and these have been dated to the wide time period of prehistoric (MWA 5129).

4.4.9 There are no records of archaeological sites within the survey area but there is an enclosure of unknown date, which was visible as an earthwork, situated to the south-east outside of the survey area (MWA 4884).

4.4.10 To the north east of the Site is Grimstock Hill, the site of an Iron Age settlement (MWA 5130) and continuing occupation into the Roman period. The area of Grimstock Hill was excavated prior to development and a Roman temple (MWA 4433), bath house (MWA 5131) and roadside settlement (MWA 10263) were all discovered along with further Roman sites in the area such as a well (MWA 6231) and wall foundations with associated pottery, brick and tile (MWA 8781). There have also been several findspots of Roman coins in the area (MWA 278; MWA 279; MWA 9773) and a chance find of a Roman coin hoard (MWA280). Within the excavation of the bath house were found prehistoric flint artefacts (MWA 5129) but no other prehistoric sites are recorded in the immediate vicinity.

4.4.11 There are no records of sites of finds of Saxon date; however, with an established medieval settlement at Coleshill (MWA 8782) to the south east there is the potential for Saxon features to exist prior to the medieval site. It is worth noting that the focus of the medieval settlement is located to the south of the area of Grimstock Hill which is the focus of Iron Age and Roman occupation (described above).

4.4.12 The existence of Coleshill medieval settlement is based on the Ordnance Survey 1st edition map of 1887 (MWA 8782). In addition to this there are buildings or inns located on Coleshill High Street which have their origins in the medieval period and are still standing today such as the building of record MWA 287 and Coleshill pillory originally situated in front of the Market Hall and now on Church Street (MWA 285).

4.4.13 In the area surrounding Coleshill are further sites dating to the medieval period, these are Coleshill Park, a medieval deer park where deer were kept for hunting (MWA 3683), a site of small settlement dating to the same period located to the north west of the medieval Coleshill town (MWA 13145), a medieval watermill situated 100m south east of Coleshill Bridge (MWA 282) and a findspot of a medieval coin (MWA 9812).

4.4.14 The area thought to be the extents of the medieval deer park are the subject of geophysical surveys CN024?23?22? There is an undated possible moated site to the south west of Gilson Hall (MWA 13146) which could possibly be of the medieval period.

4.4.15 The post-medieval period has sites of domestic, sacred and industrial use with occasional findspots in the vicinity of items such as a post-medieval coin (MWA9813).

4.4.16 Coleshill Bridge which was built during the post-medieval period, it is constructed from sandstone ashlar and is situated at Cole End, Coleshill (MWA 283). A Non-conformist chapel that was built during the late 19th century and is situated on Birmingham Road (MWA 2442). Most of the sites described below are geographically located via Coleshill Bridge.

4.4.17 There are two records for gravel pits both marked on the Ordnance Survey map of 1886 and situated 350m north of Coleshill Bridge (MWA 6112) and 450m north of Coleshill Bridge (MWA 6611). It is not known if they refer to the same gravel pit or two separate ones. Situated on Lichfield Road 100m north east of Coleshill Bridge was the site of a pound used for penning animals (MWA 6111).

4.4.18 On the west side of the River Cole, Coleshill was the site of a gas works where gas was manufactured for domestic use, it dated from the Imperial period (MWA 6592). Also during this period was a tannery 200m north of Blythe Street, Coleshill (MWA 6591).

4.4.19 Coleshill Hall is a late 19th century Grade II Listed country house with joining stables and a coach house. It was a hospital but now re-named Coleshill Manor (MWA 12714) and associated is a possible wall or gate structure of Coleshill Hall as a number of cut sandstone blocks have been unearthed on the periphery of the grounds belonging to Coleshill Manor, alongside the entrance road. They may indicate the remains of a boundary wall or gate (MWA 12713).

4.4.20 The final record is the Coleshill Royal Observer Corps Post, established in the modern period (not specifically attributed to WWII) to monitor and track enemy aircraft (MWA 9631). It was located in the area of Trajan Hill.

Methodology

Survey Objectives

4.4.21 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology which outlined the aims of the survey and the proposed methodology to be followed (Wessex Archaeology 2013). The stated aims include the following:

- to conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- to clarify the presence/absence and extent of any buried archaeological remains within the site; and
- to determine the general nature of the remains present.

4.4.22 This report presents a brief description of the methodology followed, the detailed survey results and the archaeological interpretation of the geophysical data.

Survey Dates

4.4.23 A detailed gradiometer survey was carried out by Wessex Archaeology's in-house geophysics team on 21st August 2013.

Grid Location

4.4.24 The individual survey grid nodes were established at 30m x 30m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02m and therefore exceeds English Heritage recommendations (EH 2008).

4.4.25 A representative sample of survey grid nodes (around 10%) were re-surveyed in the mornings in the event they were left out in the field overnight. This was undertaken along with a visual inspection of entire lines of grid nodes to ensure the survey grid remained accurate for the entire survey.

Instruments Used and Survey Method

4.4.26 The magnetometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. Data were collected at 0.25m intervals along transects spaced 1m apart with an effective sensitivity of 0.03nT, in accordance with EH guidelines (EH 2008).

4.4.27 Data were collected in the zigzag method with grids oriented north to south (Grid North). The first direction walked for each grid was heading towards the north.

Data Processing

4.4.28 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse (ZMT) function (±7nT thresholds) applied to correct for any variation between the two Bartington sensors used, and a de-step function to account for variations in traverse position due to varying ground cover and topography. These two steps were applied to all survey data, with no interpolation applied.

4.4.29 Further details of the geophysical and survey equipment, methods and processing are described in Appendix 1.

Data Presentation

4.4.30 The processed gradiometer data were output as .png image files and georeferenced in CAD (AutoCAD Map 3D 2011); these images were exported as georeferenced .png image files (accompanied by .pgw files). The interpretation layers were digitised in CAD and the resulting interpretation layers were exported as ESRI shapefiles, in accordance with the specification. The data images and interpretation shapefiles were then passed to our graphics team who produced the final figures in GIS (ESRI ArcMap 10).

4.4.31 The gradiometer data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots. The XY trace plot images have been produced at a scale of 1:1500.

Results

Introduction

4.4.32 The gradiometer survey has been successful in identifying anomalies of likely and possible archaeological interest, along with numerous trends. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:1250 (Figures 23 to 25).

4.4.33 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 25). Full definitions of the interpretation terms used in this report are provided in Appendix 2.

4.4.34 Numerous ferrous anomalies are visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

Interpretation: Archaeology

4.4.35 No anomalies of definite archaeological origin were identified but a number of anomalies of possible archaeology and possible archaeology (weak response) were. The most significant looking feature is at 4001 where there are several elongated oval and sub oval shaped positive anomalies that have been classified as possible archaeology, they form an approximate linear or curvilinear feature and could represent intermittent sections of a linear cut feature such as a ditch. A large area around 4005 only shows ferrous response from the modern service therefore it is not possible to detect if further similar features exist to the east of this area.

4.4.36 To the south west of 4000 where three small sub oval positive anomalies in an approximately curvilinear arrangement with a curvilinear trend of uncertain origin between them. It has been classified as possible archaeology and could represent a curvilinear ditch only surviving intermittently or it could represent pits.

4.4.37 At 4003 is another spread of small oval and sub oval positive anomalies and again these could represent cut features such as pits or postholes.

4.4.38 At 4004 extending across this part of the survey area running from north to south area several broad, irregular weakly positive anomalies that have been classified as natural, they could represent a band of bedrock running closer to the surface or could be small pockets or deposits of slightly more magnetized soils. Due to their irregularity and broad, large size they are not considered or archaeological potential.

4.4.39 To the west of this area of natural anomalies is 4002 where there is a sparse collection of sub oval positive anomalies classified as possible archaeology, they do not show any significant distribution or patterning therefore they possibly represent isolated pits and postholes. Present are also a number of weakly positive linear trends and these have been classified as of uncertain origin.

4.4.40 At 4003 is an area of increased magnetic response, it is not certain whether the cause is geological or anthropogenic but given the relative paucity of archaeological anomalies detected in the survey area and that this is next to a modern service where the surrounding ground might have been recently disturbed this could be attributable to geology. There are a number of bipolar anomalies in this area which have been classified as ferrous, some of them quite large in size and strength.

4.4.41 There are numerous linear positive anomalies that are responses to ploughing and in the northern half of the Site these area oriented north-west to south east while in the southern half of the Site they are oriented predominantly north-west to south east. The Site is currently pasture therefore this could relate to previous episodes of ploughing.

Interpretation: Modern Services

4.4.42 Two modern services have been identified in the data to the west of 4003 and at 4005. The service at 4005 appears to be a metallic/ceramic pipe that is running near an overhead electricity pylon and the service to the west of 4003 also appears to be a metallic/ceramic pipe. Large areas of ferrous response area evident around the services and this will obscure any possible anomalies of archaeological potential.

4.4.43 It is not clear from the geophysical data whether the services identified are in active use or not. Also gradiometer data will not be able to locate and identify all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT or Genny) should be used to confirm the location of buried services before any trenches are opened on site.

Conclusions

Introduction

4.4.44 The detailed gradiometer survey has been successful in detecting anomalies of possible archaeology along with areas of ploughing, numerous ferrous anomalies and two modern services.

Discussion

4.4.45 The anomalies that have been classified as possible archaeology are all of a similar weak positive response and most have poorly defined forms and do not make up any significant or obvious concentrations or formations. The only features that could possibly be part of larger linear or curvilinear features are to the south west of 4000 and at 4001. Apart from that the other possible archaeology features are randomly dispersed across the Site and the numerous trends of uncertain origin do not allow any further classification as to their possible archaeological origin.

4.4.46 The relative weak response of the anomalies could be due to the type of sediment on the Site being either gleyic or clay in origin therefore magnetic contrast might have been impaired under these soil conditions. Also there have been large infrastructure projects in the vicinity of the Site and it is noted that soil samples were not undertaken to the west of the Site due to the industrial activities being undertaken there.

References

Bibliography

English Heritage (2008), Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No. 1, 2nd Edition.

Soil Survey of England and Wales (1983), Sheet 3, Soils of Midland and Western England. Ordnance Survey: Southampton.

Ordnance Survey (1977), Quaternary Map of the United Kingdom: South. Ordnance Survey: Southampton.

Ordnance Survey (1957), Sheet 2, Geological Map of Great Britain: England and Wales. Ordnance Survey: Chessington.

Wessex Archaeology (2013), HS2: Geophysical Survey Written Scheme of Investigation. Report Reference: 86254.01.

HER Records Consulted

MWA 5130 Site of Iron Age settlement on Grimstock Hill.

MWA 5129 Findspot of prehistoric flint artefacts.

MWA 4433 Site of Roman temple on Grimstock Hill.

MWA 5131 Site of Roman Bath House on Grimstock Hill.

MWA 10263 Romano British roadside settlement on the Ennersdale Road area of Coleshill.

MWA 278 Findspot of Roman coin found 200m north of Grimstock Hall.

MWA 6231 site of Roman well found 500m east of Gilson Hall.

MWA 279 Findspot of several Roman coins found near Rose Road, Coleshill.

MWA 280 Findspot of Roman coin hoard dating to Roman period and found to the east of Ennersdale Road, Coleshill.

MWA 8781 Roman wall and finds of Roman pottery, brick and tile.

MWA 9811 Find of Roman coin on the Water Orton/Coleshill boundary.

MWA 9773 Chance find of a Roman coin in Coleshill in the area of Temple Way, Norton Leas.

MWA 8782 Coleshill Medieval Settlement, based on OS 1st edition map of 1887

MWA 3683 Site of Coleshill Park, a medieval deer park.

MWA 285 Coleshill pillory originally situated in front of the Market Hall it is now on Church Street, Coleshill.

MWA 287 Building which has its origins in the medieval period, located on the High Street, Coleshill.

MWA 282 Site of watermill built during the medieval period, situated 100m south east of Coleshill Bridge

MWA 9812 Find of a medieval coin to the east of the hospital in Water Orton.

MWA 13145 Site of small settlement dating to Middle Ages located to the north west of the medieval Coleshill town.

MWA 283 Coleshill Bridge which was built during the post-medieval period.

MWA 2442 Non-conformist chapel that was built during the Imperial period and situated on Birmingham Road

MWA 6112 Site of gravel pit from which gravel was extracted, marked on OS map of 1886 and situated 350m north of Coleshill Bridge.

MWA 6611 Gravel pit marked on OS map of 1886 and situated 450m north of Coleshill Bridge.

MWA 9813 Find of a post-medieval coin on the Water Orton/Coleshill boundary.

MWA 6592 Site of gas works where gas was manufactured for domestic use, it dated from the Imperial period and was situated on the west side of the River Cole, Coleshill.

MWA 6591 Site of a tannery in use during the Imperial period and was situated 200m north of Blythe Street, Coleshill.

MWA 6111 Site of Pound, used for penning animals, situated on Lichfield Road 100m north east of Coleshill Bridge.

MWA 12714 Coleshill Hall 1873 country house with joining stables and a coach house. Grade II Listed. Was a hospital, now re-named Coleshill Manor.

MWA 12713 Possible wall or gate structure of Coleshill Hall (see entry above).

MWA 9631 Coleshill Royal Observer Corps Post, established in Modern period to monitor and track enemy aircraft. It was located in the area of Trajan Hill.

MWA 4884 enclosure of unknown date was visible as an earthwork, situated 500m west of Colehill Bridge.

MWA 13146 Possible moated site to the south west of Gilson Hall

Figures

Figure 26: Site location

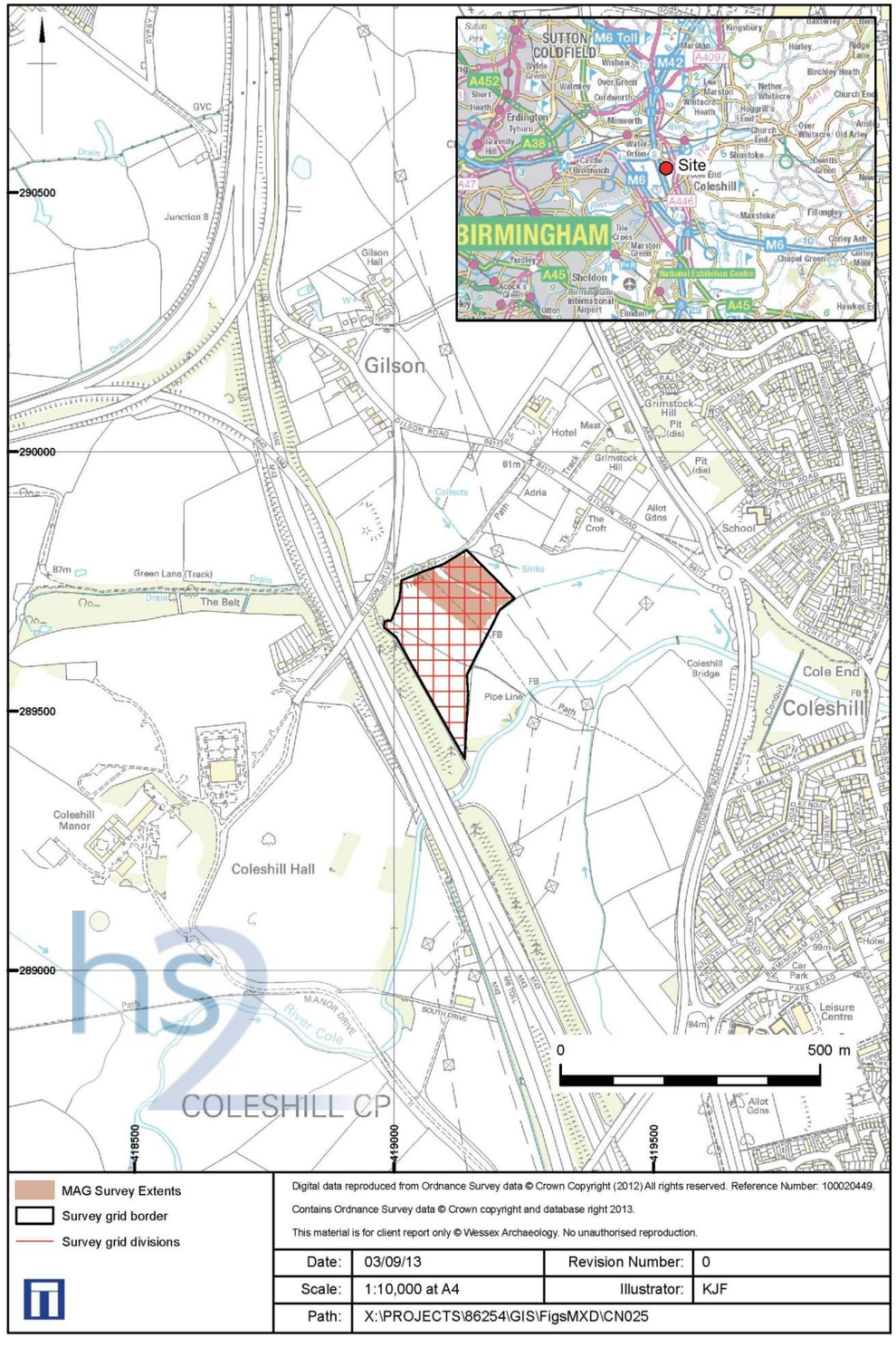


Figure 27: Greyscale plot

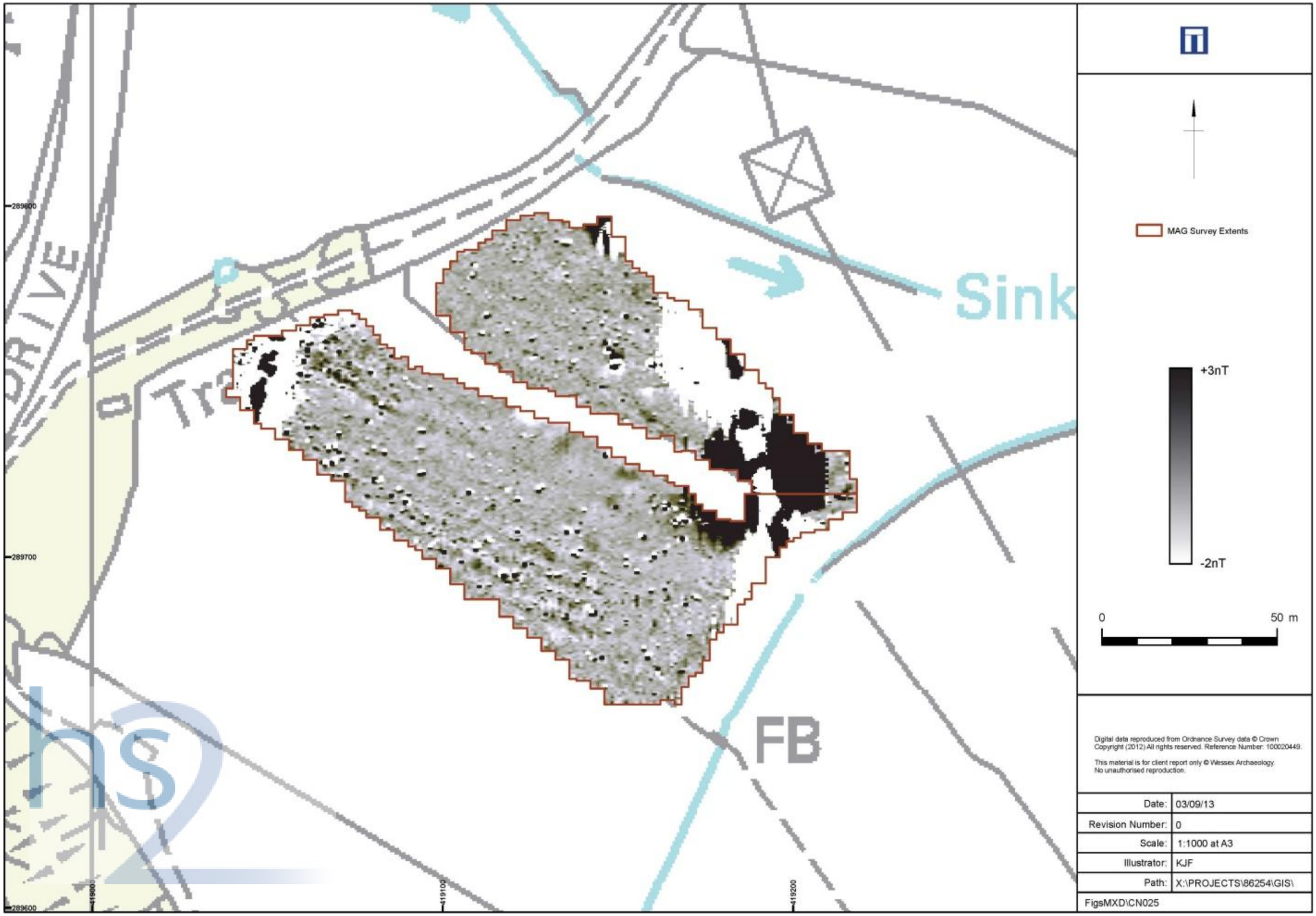


Figure 28: XY trace

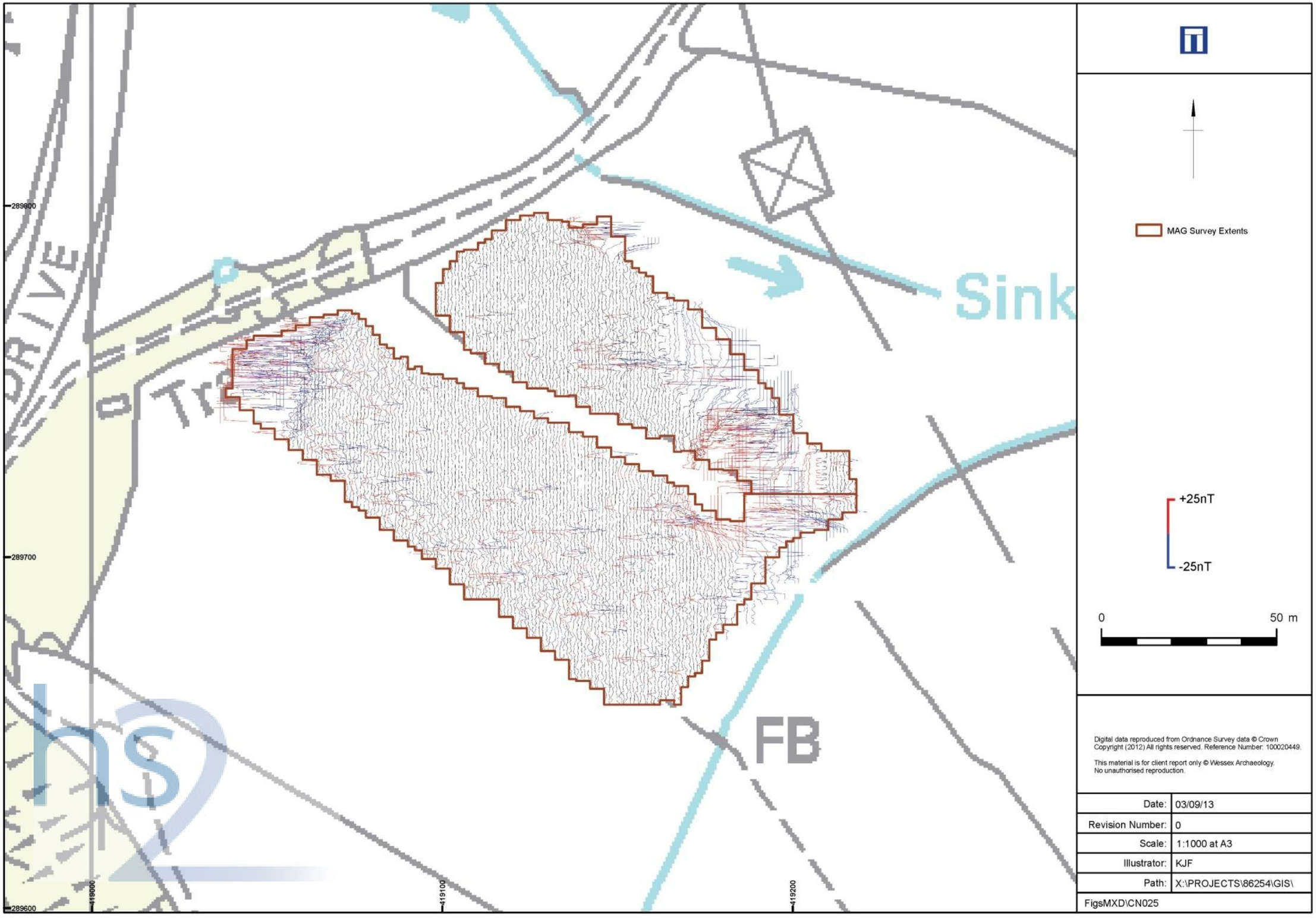
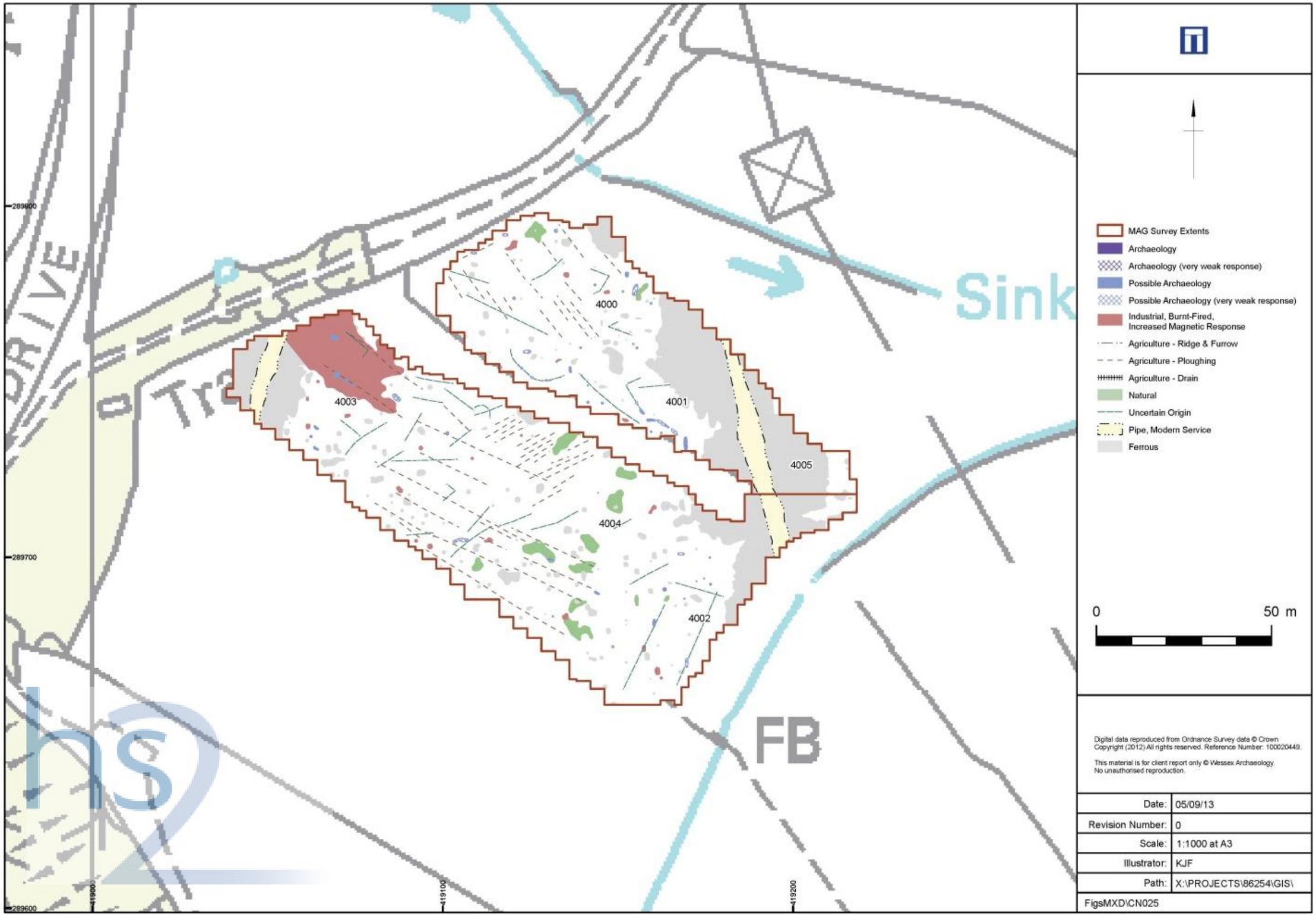


Figure 29: Interpretation



4.5 CN026 Land off Sutton Roan (A429), near Drayton Bassett, Staffordshire

Introduction

Project Background

4.5.1 Wessex Archaeology was commissioned by Atkins, on the behalf of HS2, to carry out a geophysical survey of area CN038 off Sutton Road (A453), near Drayton Bassett, Staffordshire (Figure 26), hereafter "the Site" (centred on NGR 416880 300320). The survey forms part of an ongoing programme of archaeological works being undertaken ahead of the proposed development of HS2.

4.5.2 This Site, CN026, was selected for geophysical survey as it is considered to be an area at high risk (risk model score: 2/3).

Site details

4.5.3 The site comprised three fields located approximately1.4km south-west of Water Orton, Warwickshire. The site is bounded to the north by Watton Lane, to the west by Gilson Road, to the east by Lichfield Road and to the south by a track. The gradiometer survey covered 15ha and has demonstrated the presence of anomalies of likely and possible archaeological interest within the survey area, along with regions of increased magnetic response and a large amount of ferrous. The anomalies of likely and possible interest are not concentrated in one particular area of the site.

4.5.4 The Site lies on an area of gently sloping land that falls away towards the north. The southeast region of the survey area lies at a height of 98m aOD (above Ordnance Datum) and falls from this height to less than 80m aOD at the northeast corner of the Site.

4.5.5 The solid geology is recorded as Keuper marl (Triassic) (Ordnance Survey 1957). The superficial deposits recorded on Site and close by are river terrace deposits, alluvium and glacial deposits (Ordnance Survey 1977). The soils underlying the Site are likely to be typical stagnogley soils of the 711m (Salop) association (SSEW 1983). Soils derived from such geological parent material have been shown to produce magnetic contrasts acceptable for the detection of archaeological remains through magnetometer survey.

Archaeological Background

4.5.6 For a detailed assessment of the known archaeology of the Site and surrounding area the relevant DBA should be consulted. A summary of the most relevant sites within or close to the survey area will be discussed only.

4.5.7 The site of a Roman temple, roadside settlement and a wall are recorded to the east of the survey area. These sites were discovered during an archaeological excavation over the area in 1978; the site appears to have been occupied from at least the late Iron Age and the remains uncovered date as late as the fourth century AD (MWA4433, MWA6232, MWA8781 and MWA10263). There are a number of findspots in the local area including the find of a brooch within the survey area and coin finds in the surrounding area (MWA278, MWA875 and MWA9773).

4.5.8 Medieval remains are recorded to the west of the survey area including a settlement at Gilson, and a possible moated site near Gilson Hall (MWA13145 and MWA 13146).

Methodology

Survey Objectives

4.5.9 A Written Scheme of Investigation (WSI) was prepared by Wessex Archaeology which outlined the aims of the survey and the proposed methodology to be followed (Wessex Archaeology 2013). The stated aims include the following:

- to conduct a detailed survey which covers as much of the specified area as possible, allowing for artificial obstructions;
- to clarify the presence/absence and extent of any buried archaeological remains within the site; and
- to determine the general nature of the remains present.

4.5.10 This report presents a brief description of the methodology followed, the detailed survey results and the archaeological interpretation of the geophysical data.

Survey Dates

4.5.11 A detailed gradiometer survey was carried out by Wessex Archaeology's in-house geophysics team between the 18th and the 25th July 2013.

Grid Location

4.5.12 The individual survey grid nodes were established at 30m x 30m intervals using a Leica Viva RTK GNSS instrument, which is precise to approximately 0.02m and therefore exceeds English Heritage recommendations (EH 2008).

4.5.13 A representative sample of survey grid nodes (around 10%) were re-surveyed in the mornings in the event they were left out in the field overnight. This was undertaken along with a visual inspection of entire lines of grid nodes to ensure the survey grid remained accurate for the entire survey.

Instruments Used and Survey Method

4.5.14 The magnetometer survey was conducted using a Bartington Grad601-2 fluxgate gradiometer instrument, which has a vertical separation of 1m between sensors. Data were collected at 0.25m intervals along transects spaced 1m apart with an effective sensitivity of 0.03nT, in accordance with EH guidelines (EH 2008).

4.5.15 Data were collected in the zigzag method with grids oriented north to south (Grid North). The first direction walked for each grid was heading towards the north.

Data Processing

4.5.16 Data from the survey was subject to minimal data correction processes. These comprise a zero mean traverse (ZMT) function (±8nT thresholds) applied to correct for any variation between the two Bartington sensors used, and a de-step function to account for variations in traverse position due to varying ground cover and topography. These two steps were applied to all survey data, with no interpolation applied.

4.5.17 Further details of the geophysical and survey equipment, methods and processing are described in Appendix 1.

Data Presentation

4.5.18 The processed gradiometer data were output as .png image files and georeferenced in CAD (AutoCAD Map 3D 2011); these images were exported as georeferenced .png image files (accompanied by .pgw files). The interpretation layers were digitised in CAD and the resulting interpretation layers were exported as ESRI shapefiles, in accordance with the specification. The data images and interpretation shapefiles were then passed to our graphics team who produced the final figures in GIS (ESRI ArcMap 10).

4.5.19 The gradiometer data are displayed at -2nT (white) to +3nT (black) for the greyscale image and ±25nT at 25nT per cm for the XY trace plots. The XY trace plot images have been produced at a scale of 1:2000.

Results

Introduction

4.5.20 The gradiometer survey has been successful in identifying anomalies of likely and possible archaeological interest, along with numerous trends. Results are presented as a series of greyscale and XY plots, and archaeological interpretations, at a scale of 1:2000 (Figures 27 to 29).

4.5.21 The interpretation of the datasets highlights the presence of potential archaeological anomalies, ferrous/burnt or fired objects, and magnetic trends (Figure 29). Full definitions of the interpretation terms used in this report are provided in Appendix 2.

4.5.22 Numerous ferrous anomalies are visible throughout the detailed survey dataset. These are presumed to be modern in provenance and are not referred to, unless considered relevant to the archaeological interpretation.

Interpretation: Archaeology

4.5.23 The northern two fields are dominated by ferrous responses that are strong enough to mask the responses expected from archaeological features. This has reduced the area in which the detection of archaeological is possible; the northern field at 4000 is almost completely covered with ferrous responses and the field south of this is almost as densely covered.

4.5.24 In spite of the ferrous a few possible archaeological features are visible in places. A curvilinear anomaly is visible at 4001 that has weakly positive magnetic values (less than +3nT); its form is fairly diffuse and this feature could also represent a geological feature. Because only a small area of this feature is visible among the ferrous and it resembles geology this feature has been classed as possible archaeology; if archaeological it may represent a ditch.

4.5.25 Another linear positive anomaly with stronger values and a few irregular shaped positive anomalies are present at 4002 and 4003. They have values over +3nT and are considered to possibly represent cut archaeological features such as ditch sections and pits.

4.5.26 The only anomalies considered to be of likely archaeological interest are four pit-like positive anomalies at 4004, 4005, 4006 and 4007. They possess values over +3nT and the shape of their responses in the XY trace plots suggests they are more likely to represent cut features such as pits than others visible in the data. These pits form no overall pattern in their spatial distribution. There is an unusual positive anomaly to the north of 4005; this anomaly is not clearly pit-like but does not appear to be a ferrous anomaly. It has been classed as increased magnetic response but could prove to be archaeological representing an area of burning or a large pit filled with highly magnetised debris.

4.5.27 There are a number of faint linear trends visible in the data and some of these may prove to be of archaeological significance. Curved examples such as at 4008 and L-shaped examples such as at 4009 are particularly different from others observed elsewhere. These trends are classed as uncertain origin as it is not possible to characterise them from the geophysical data alone. The remaining trends visible in the data are ceramic field drains such as at 4010 and ploughing trends such as those around 4011.

4.5.28 There are numerous small sub-circular and sub-oval shaped positive anomalies visible in the data. These may represent spikes in the data, unusual ferrous responses or geological anomalies but some of these responses may prove to be archaeological representing small cut features such as postholes. As there is no significant patterning in their spatial distribution they have been classed as possible archaeology.

4.5.29 At least three modern services are visible at 4012, 4013, 4014 and 4015. These anomalies will be discussed in the next section of the report.

4.5.30 A large spread of dipolar and bipolar responses is present at 4016 and 4017; this spread is presumed to either represent a spread of relatively modern debris or is a change in the geology. This spread is not considered to be of any archaeological significance.

4.5.31 The last group of anomalies visible in the data are broad, diffuse positive linear features. These responses are considered to represent geological features and have been classed as natural.

Interpretation: Modern Services

4.5.32 There are at least three modern services visible in the data. The first, at 4012, is considered to possibly represent an underground cable. The remaining responses at 4013, 4014 and 4015 all look to be representative of ferrous/ceramic pipes. It is possible, given the wide spreads of ferrous, that there are other services present that aren't easily distinguishable from the wide and dense spreads of ferrous objects.

4.5.33 It is not clear from the geophysical data whether the services identified are in active use or not. Also gradiometer data will not be able to locate and identify all services present on site. This report and accompanying illustrations should not be used as the sole source for service locations and appropriate equipment (e.g. CAT and Genny) should be used to confirm the location of buried services before any trenches are opened on site.

Conclusions

Introduction

4.5.34 The detailed gradiometer survey has been successful in detecting anomalies of likely and possible archaeological interest within the Site, in addition to regions of increased magnetic response and numerous trends of uncertain origin.

Discussion

4.5.35 The data shows very few anomalies of likely archaeological interest apart from four pit-like anomalies. The anomaly of increased magnetic response north of 4005 may prove to be of archaeological significance.

4.5.36 The northern two fields have clearly been covered with a lot of strongly magnetised debris. This debris has magnetic values that are high enough to mask the weaker responses expected from archaeological features. This has reduced the area in which archaeological features are visible, especially around services and field edges. It may be that more archaeological features are present than were detected in the geophysical data presented in this report.

4.5.37 The relative dimensions of the modern services identified by the gradiometer survey are indicative of the strength of their magnetic response, which is dependent upon the materials used in their construction and the backfill of the service trenches. The physical dimensions of the services indicated may therefore differ from their magnetic extents in plan; it is assumed that the centreline of services is coincident with the centreline of their anomalies. It is difficult to estimate the depth of burial of the services through

4.5.38 It should be noted that small, weakly magnetised features may produce responses that are below the detection threshold of magnetometers. It may therefore be the case that more archaeological features may be encountered than have been identified through geophysical survey. Given how weak many of the features interpreted in this data are it seems very likely that more features may be present than were detected during the survey.

References

Bibliography

English Heritage (2008), Geophysical Survey in Archaeological Field Evaluation. Research and Professional Service Guideline No. 1, 2nd Edition.

Soil Survey of England and Wales (1983), Sheet 3, Soils of Midland and Western England. Ordnance Survey: Southampton.

Ordnance Survey (1977), Quaternary Map of the United Kingdom: South. Ordnance Survey: Southampton.

Ordnance Survey (1957), Sheet 2, Geological Map of Great Britain: England and Wales. Ordnance Survey: Chessington.

Wessex Archaeology (2013), HS2: Geophysical Survey Written Scheme of Investigation. Report Reference: 86254.01.

HER Records Consulted

MWA278 – Findspot, Roman coin

4.5.39 MWA875 – Findspot, Roman brooch

4.5.40 MWA4433 – Site of Roman Temple on Grimstock Hill

4.5.41 MWA6232 – Site of Romano British Settlement on Grimstock Hill

4.5.42 MWA8781 – Roman Wall and finds, Ennersdale Road, Coleshill

4.5.43 MWA9773 – Roman Coin found in Coleshill

4.5.44 MWA10263 – Romano British Settlement in Coleshill

4.5.45 MWA13145 – Site of medieval settlement of Gilson

4.5.46 MWA13146 – Possible moated site near Gilson Hall, Coleshill

Figures

Figure 30: Site location

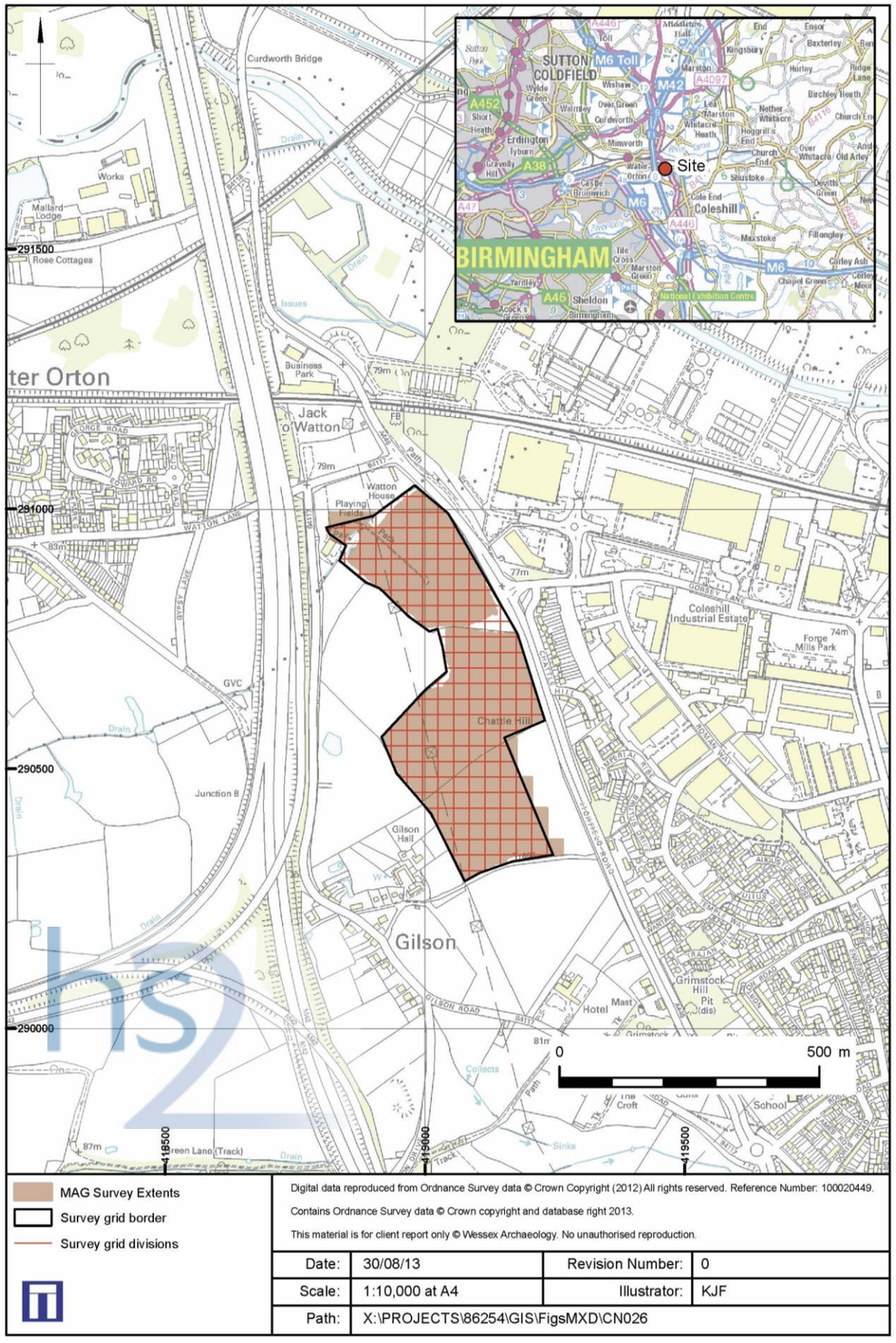


Figure 31: Greyscale plot

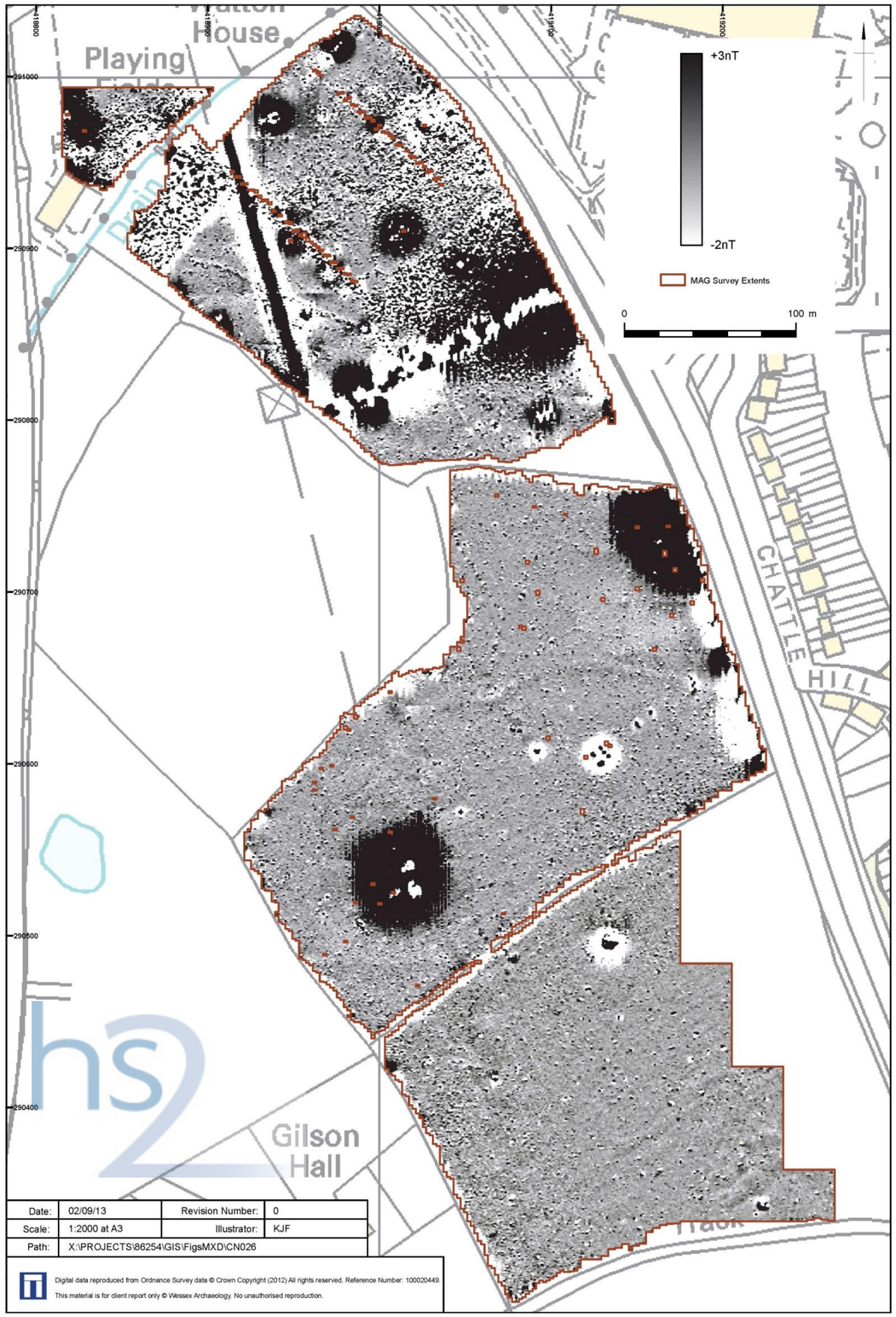


Figure 32: XY trace

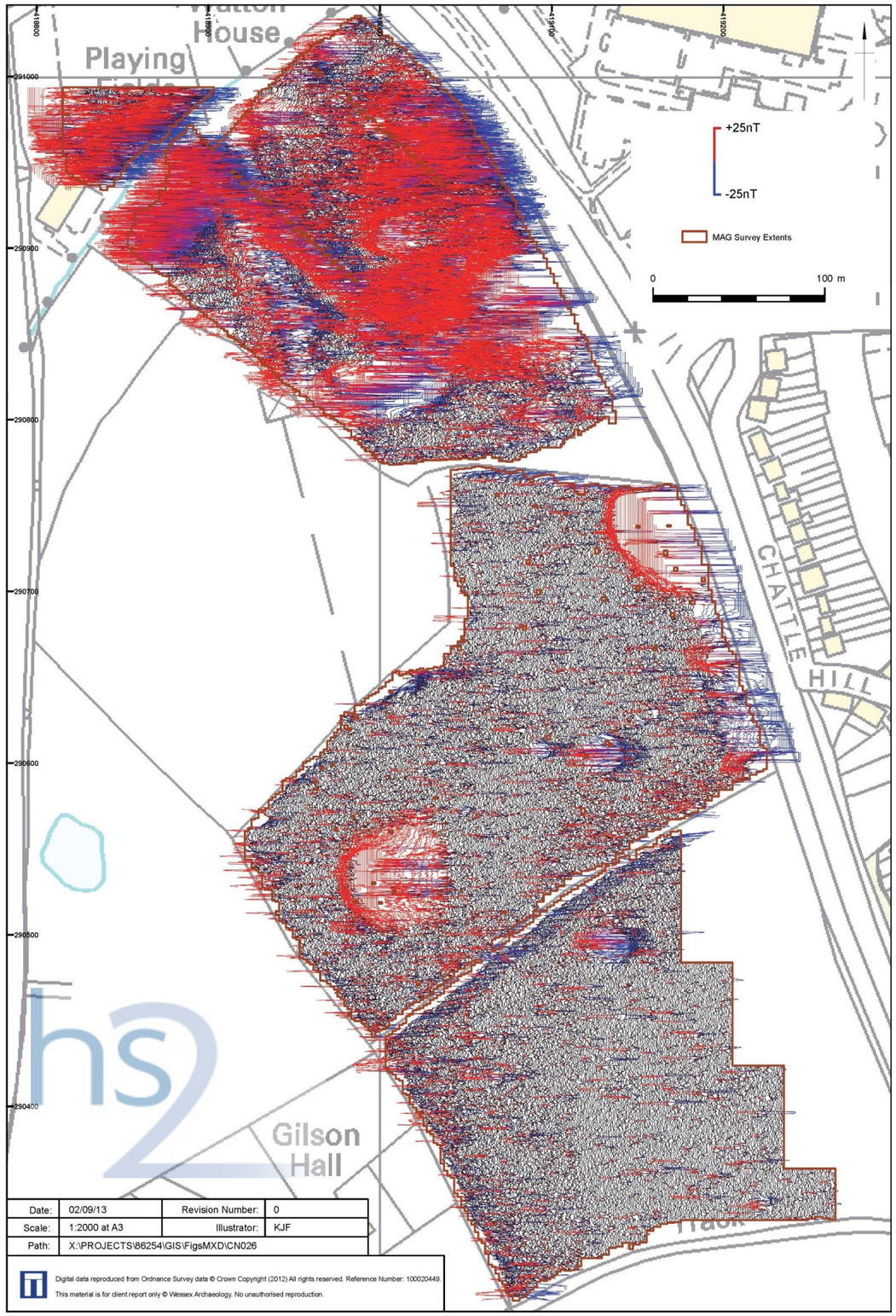
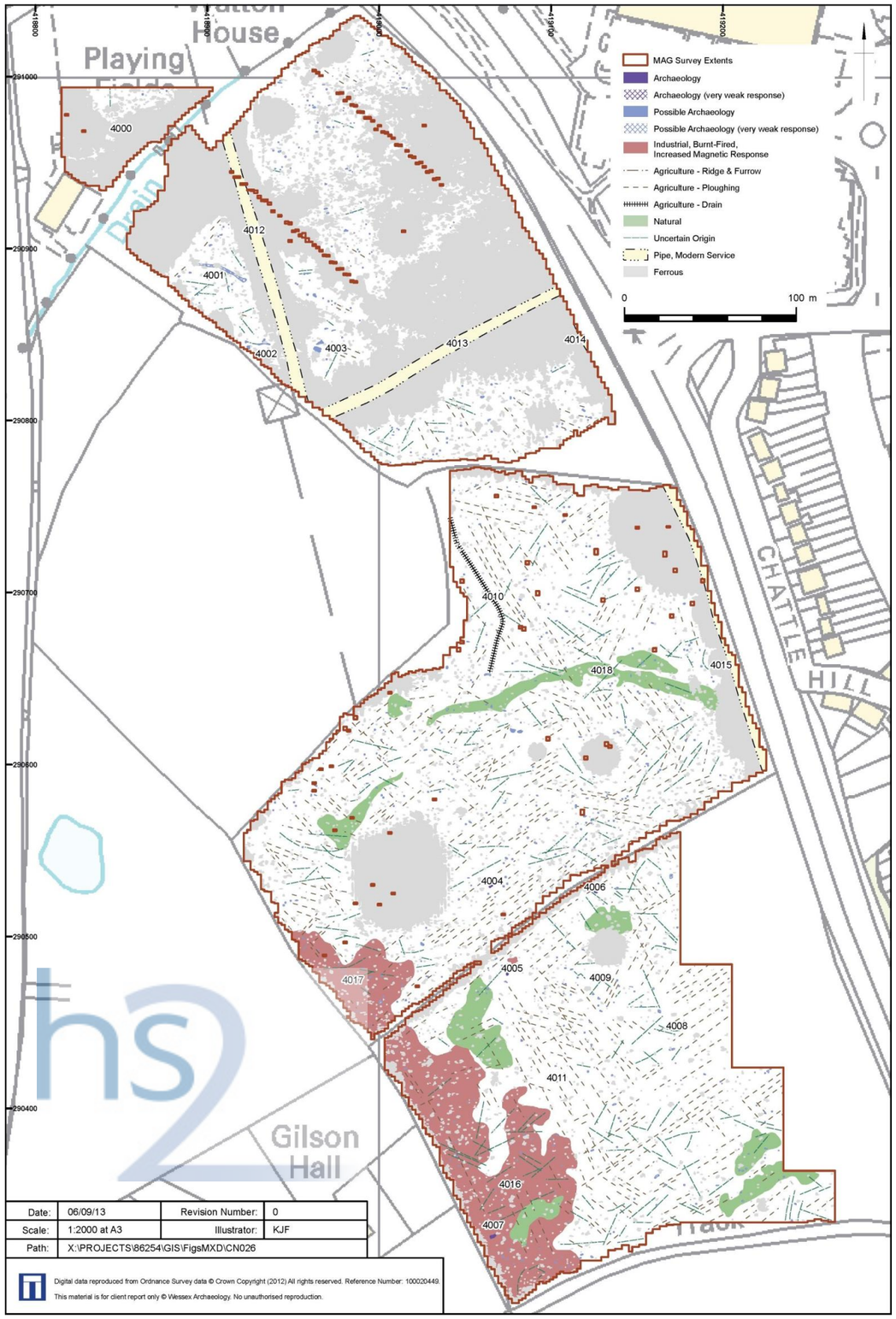


Figure 33: Interpretation



5 Appendix 1. Survey Equipment and Data Processing

5.1 Survey Methods and Equipment

5.1.1 The magnetic data for this project was acquired using a Bartington 601-2 dual magnetic gradiometer system. This instrument has two sensor assemblies fixed horizontally 1m apart allowing two traverses to be recorded simultaneously. Each sensor contains two fluxgate magnetometers arranged vertically with a 1m separation, and measures the difference between the vertical components of the total magnetic field within each sensor array. This arrangement of magnetometers suppresses any diurnal or low frequency effects.

5.1.2 The gradiometers have an effective resolution of 0.03nT over a ±100nT range, and measurements from each sensor are logged at intervals of 0.25m. All of the data are stored on an integrated data logger for subsequent post-processing and analysis.

5.1.3 Wessex Archaeology conducts detailed gradiometer surveys using an accurate 20m or 30m site grid, which is achieved using a Leica Viva RTK GNSS instrument and then extended using tapes. The Leica Viva system receives corrections from a network of reference stations operated by the Ordnance Survey and Leica Geosystems, allowing positions to be determined with a precision of 0.02m in real-time and therefore exceed the level of accuracy recommended by English Heritage (2008) for geophysical surveys.

5.1.4 The detailed surveys consist of 20m x 20m or 30m x 30m grids, and data are collected at 0.25m intervals along traverses spaced 1m apart. These strategies give 1600 or 3600 measurements per 20m or 30m grid respectively, and are the recommended methodologies for archaeological surveys of this type (EH 2008).

5.1.5 Data may be collected with a higher sample density where complex archaeological anomalies are encountered, to aid the detection and characterisation of small and ephemeral features. Data may be collected at up to 0.125m intervals along traverses spaced up to 0.25m apart, resulting in a maximum of 28800 readings per 30m grid, exceeding that recommended by English Heritage (2008) for characterisation surveys.

5.2 Post-Processing

5.2.1 The magnetic data collected during the detail survey are downloaded from the Bartington system for processing and analysis using both commercial and in-house software. This software allows for both the data and the images to be processed in order to enhance the results for analysis; however, it should be noted that minimal data processing is conducted so as not to distort the anomalies.

5.2.2 As the scanning data are not as closely distributed as with detailed survey, they are georeferenced using the GPS information and interpolated to highlight similar anomalies in adjacent transects. Directional trends may be removed before interpolation to produce more easily understood images.

5.2.3 Typical data and image processing steps may include:

- destripe – applying a zero mean traverse in order to remove differences caused by directional effects inherent in the magnetometer;
- destagger – shifting each traverse longitudinally by a number of readings. This corrects for operator errors and is used to enhance linear features;
- despike – filtering isolated data points that exceed the mean by a specified amount to reduce the appearance of dominant anomalous readings (generally only used for earth resistance data);
- deslope – this function is used to remove a linear trend within a data set. It is most commonly used to remove grid edge discontinuities that can result from applying zero mean traverse to a data set; and
- multiply – the multiply function multiplies the data by a negative or positive constant value. It has a variety of functions but its typical use is to normalise data that has been collected with sensors at different heights from the ground.

5.2.4 Typical displays of the data used during processing and analysis:

- XY plot – presents the data as a trace or graph line for each traverse. Each traverse is displaced down the image to produce a stacked profile effect. This type of image is useful as it shows the full range of individual anomalies; and
- greyscale – presents the data in plan view using a greyscale to indicate the relative strength of the signal at each measurement point. These plots can be produced in colour to highlight certain features but generally greyscale plots are used during analysis of the data.

6 Appendix 2: Geophysical Interpretation

6.1 Interpretation Categories

6.1.1 The interpretation methodology used by Wessex Archaeology separates the anomalies into two main categories: archaeological and unidentified responses.

6.1.2 The archaeological category is used for features when the form, nature and pattern of the anomaly are indicative of archaeological material. Further sources of information such as aerial photographs may also have been incorporated in providing the final interpretation. This category is further sub-divided into three groups, implying a decreasing level of confidence:

- archaeology – used when there is a clear geophysical response and anthropogenic pattern; and
- possible archaeology – used for features which give a response but which form no discernible pattern or trend.

6.1.3 The unidentified category is used for features when the form, nature and pattern of the anomaly are not sufficient to warrant a classification as an archaeological feature. This category is further sub-divided into:

- industrial, burnt-fired, increased magnetic response – used for areas dominated by bipolar and dipolar anomalies which may have some archaeological potential;
- uncertain origin – used for low amplitude or indistinct linear anomalies;
- ferrous – used for responses caused by ferrous material. These anomalies are likely to be of modern origin;
- agricultural – used for linear trends that can be shown to relate to agricultural activity including ridge and furrow, drainage and ploughing scars; and
- natural – used for spreads of anomalies that are considered to be geological or more discrete anomalies considered to be natural.

6.1.4 Finally, services such as water pipes are marked where they have been identified along with ceramic field drains.